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CLINICAL ARTICLE

# Comparison of the pain experienced by infertile women undergoing hysterosalpingo contrast sonography or radiographic hysterosalpingography

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ABSTRACT

*Objective:* To evaluate the pain and cause of pain experienced by women undergoing hysterosalpingography (HSG) and contrast hysterosalpingo sonography (HyCoSy) with air in a saline solution for the assessment of uterine and tubal patency. *Method:* In this prospective study, 121 infertile women undergoing these 2 procedures measured the pain incurred using a digital/analog scale (1–10). We looked for correlations between pain level and variables pertaining to the procedures. Vagal effects and their persistence were also recorded. *Results:* The pain was less during HSG (median, 5) than during HyCoSy (median, 7). It was greater than menstrual pain for 38.8% of participants during HSG and for 70.5% of participants during HyCoSy. There was no correlation between pain and difficult catheter passage, degree of tubal obstruction, volume of contrast medium injected, or presence of IgG antibodies to *Chlamydia* when these variables were studied for HyCoSy alone. However, the strong correlation between pain score and volume of contrast medium injected during each procedure seems to explain the significantly higher pain levels during HyCoSy ($P<0.001$). In 65.3% and 57.8% of participants, respectively, the pain disappeared immediately after the HSG or HyCoSy. Only mild vagal effects were recorded following both procedures, in 0.8% of participants after HSG and 2.5% of participants after HyCoSy. *Conclusion:* Hysterosalpingo contrast sonography is similar to HSG regarding rapidity of pain disappearance, and infrequency and moderation of vagal effects, but the level of pain is slightly higher, probably due to the greater volume of medium injected.


## 1. Introduction

Infertility due to uterine or tubal obstruction is responsible for more than 30% of all infertility cases [1]. Although laparoscopy with chromopertubation associated with hysteroscopy is now the gold standard for assessing the patency of the uterine cavity and fallopian tubes, the assessment is still often performed by hysterosalpingography (HSG) at outpatient clinics. The accuracy of HSG is admittedly low, but it is increased when associated with hysterosalpingo contrast sonography (HyCoSy) [2–5]. This other ambulatory procedure consists of visualizing the uterine cavity and tubes by ultrasound after injecting a contrast medium, negative for the uterus or positive for the tubes [6,7].

A study using the values for the gold standard to compare the sensitivity and specificity of HSG and HyCoSy reported the rates for HyCoSy to be similar, or perhaps somewhat superior, to those of HSG [8]. In a review, Killick [9] reported rates of 47% to 90% for sensitivity and 87% to 100% for specificity for HyCoSy. In another review, however, Helpman et al. [10] reported rates of 90.2% to 100% for sensitivity and 55% to 83.3% for specificity. Lower sensitivity and specificity rates for HyCoSy, 71% and 69% [8] or 76% and 80% [11], have been reported when checking for tubal patency. For uterine patency, rates of 90% and 40% have been reported [12].

From our experience [13] and from the literature [9], we estimate that when HSG and HyCoSy are both used, the negative predictive values (NPVs) for the tubal and uterine evaluations are so high (94% in our study [13]) that laparoscopy can be avoided in many infertile women. The negative contrast agent generally used to check uterine patency is a saline solution. Although commercial positive contrast agents are widely used to check the tubal patency, good results can also be obtained more economically by injecting air into the saline solution after the uterine cavity has been inspected [6,7]. Air being a weaker contrast agent than commercial ones, however, the higher volume needed for good accuracy could induce greater pain and more frequent vagal effects. Many studies have analyzed the accuracy of HyCoSy performed with air as the contrast agent, and found it similar to that of HSG [6,8,14]. To our knowledge, none has reported in detail on the participants' toleration of this method.

The aims of the present study were to compare the pain and adverse effects incurred by women undergoing both HSG and HyCoSy,

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with air as the contrast agent to check tubal patency during HyCoSy. We also looked for correlations between the intensity of the pain incurred and independent variables pertaining to HyCoSy.

## 2. Patients and methods

This Canadian Task Force Classification II-2 prospective comparative study was conducted with 121 infertile women at "Cuza Voda" University Hospital of Obstetrics and Gynecology Iaşi, Romania, from January 6, 2007, to January 6, 2009. The study was approved by the institutional ethics committee and all participants signed an informed consent form before inclusion.

All HSG procedures were performed by the same radiologist using a Mercury 332/2006 machine (Villa Medical Systems SPA, Buccinasco, Italy) and all HyCoSy procedures were performed by the same gynecologist using a General Electric Voluson 730PRO/2007 scanner (GE Healthcare, Milwaukee, Wisconsin, USA). The patients underwent the 2 procedures within 3 months of each other, always in the first 12 days of the menstrual cycle.

Only women who had been infertile for more than 1 year were included in the study. Their mean age was 31 years (range, 21–41 years). Exclusion criteria were as follows: infertility for less than 1 year; a C-reactive protein level higher than 10 mg/L; not having undergone the procedures within 3 months of each other; and the inability to inject the contrast medium in the case of HSG, or place a catheter in the case of HyCoSy, whether it be due to cervical or isthmic spasm or to complete intrauterine adhesions.

The HSG procedure unfolded as follows: After the cervix was exposed with a speculum, a cervical forceps was applied and 300 ng/mL of iohexol, a tri-iodide, nonionic, hydrosoluble contrast agent (Omnipaque; Nycomed, Dublin, Ireland) was slowly injected under radioscopic guidance into the external cervical os using a Schultze cannula (Aesculap, Tuttlingen, Germany). We took 2 radiographic images. The first was taken after the complete injection of the contrast medium, when we could assume that the uterine cavity and the tubes were opacified and the medium had reached the peritoneum. The second was taken 20 minutes (the Cotte time) after the inception of the procedure to evaluate the volume of the contrast agent present in the peritoneal cavity. The duration of the procedure and the volume of the contrast agent were recorded.

The HyCoSy procedure unfolded as follows: After the cervix was exposed with a speculum, the uterus and ovaries were evaluated by transvaginal ultrasound (which also confirmed an initial absence of fluid in the pouch of Douglas). A balloon catheter (Cook Medical, Limerick, Ireland) was then inserted into the cervix. After the position of the catheter was checked, the balloon was inflated and 10 mL of a saline solution was injected to allow a 3-dimentional evaluation of the uterine cavity. Another 20 mL was injected after the transvaginal probe was inserted to visualize the right uterine horn and tubal path. If visualization was not possible, 20 more milliliters were injected. The same was repeated on the left side. At the end of the procedure, the volume of fluid accumulated in the peritoneal cavity was calculated, the balloon deflated, and the catheter removed.

Immediately after undergoing either procedure, the participants answered a questionnaire evaluating the pain they experienced by means of an analog/digital scale. The values for the scale ranged from 1 (very favorable) to 10 (very unfavorable). The participants also assessed the pain they usually felt during a menstrual period using the same scale. Then, they assessed their pain using the Stacey score [15]. The values for the score were 0 (no reaction or discomfort), 1 (slight pain, less than menstrual pain), 2 (moderate pain, exceeding menstrual cramps but no vagal effects), 3 (vagal effects or pain requiring observation in a hospital), and 4 (vagal effects or pain requiring resuscitation) [15]. The vagal effects included nausea/vomiting, weakness, syncope, hypotension, and bradycardia. Painful sensations were then categorized as acute pain, discomfort, or pressure pain.

After 24 hours and after 1 month, the participants were contacted by phone to inquire about pain persistence, and whether a pain-relieving treatment had been necessary. We intended to compare the duration of the 2 procedures, the volume of contrast agent each necessitated, and the vagal effects. We also intended to determine whether there was a relationship between the intensity of the pain incurred during the HyCoSy, as expressed on the analog/digital scale, and several independent variables. These were difficult passage of the catheter, amount of contrast medium injected, unilateral or bilateral tubal blockage, presence of IgG antibodies to *Chlamydia*, and the day in the patient's menstrual cycle when the procedure was performed. (We supposed that, if it was performed close to the first day, it could be more painful because of increased uterine activity [3].)

For statistical interpretation we used the Mann-Whitney *U* test, the Kruskal-Wallis test, the Spearman rank correlation ($\rho$) test, and the Wilcoxon signed rank test.

## 3. Results

There were 56 participants who underwent the HSG as their first procedure because the other 65 preferred to undergo HyCoSy first, sometimes because they found the scheduling proposed by the Radiologic and Ultrasound Department convenient.

The duration of the HSG procedure, or the time it took to complete the contrast medium injection, ranged from 3–31 minutes (median, 10 minutes; mean ± SD, 10.63 ± 5.25 minutes). After 20 minutes, we evaluated the volume of the medium spilled into the peritoneal space (the Cotte evaluation). The duration of the HyCoSy procedure, or time between the insertion and extraction of the catheter, ranged from 5–16 minutes (median, 10 minutes; mean ± SD, 9.85 ± 2.72 minutes). There was no significant difference in duration between the 2 procedures ($P = 0.22$ by the Wilcoxon signed rank test). The amount of the contrast substance used was significantly different, however. It ranged from 5–10 mL (mean, 7.67 ± 1.56) during the HSG procedure ($P < 0.001$ by the Wilcoxon signed rank test) and from 20–100 mL (mean, 50.10 ± 17.47 mL) during the HyCoSy procedure.

The analog/digital scale values ranged from 1–10 (median, 5) for HSG and from 2–10 (median, 7) for HyCoSy ($P < 0.001$ by the Wilcoxon signed rank test). We therefore conclude that the participants experienced more pain during the HyCoSy procedure.

The Stacey score ranged from 0–3 (median, 1) for HSG and from 0–3 (median, 2) for HyCoSy ($P < 0.001$ by the Wilcoxon signed rank test). Because the median was 2 for HyCoSy versus 1 for HSG, we conclude that the participants had a higher Stacey score after undergoing HyCoSy.

The HSG procedure caused nausea in 8 participants, vomiting in 2 participants, and headaches in 2 participants. The HyCoSy procedure caused nausea in 13 participants, vomiting in 2 participants, headaches in 3 participants, and faintness with sweating in 4 participants. No patient experienced vagovagal syncope, bradycardia, or hypotension requiring cardiorespiratory resuscitation.

The pain experienced by the participants during the 2 procedures, as categorized, is shown in Table 1. A comparison of the pain levels experienced during the HyCoSy procedure and during menstruation (using an analog/digital scale 1–10) is shown in Table 2.

The pain disappeared immediately after the end of the HSG procedure in 79 participants (65.3%) and within 2 hours in 17 participants (14%). It disappeared immediately after the end of the HyCoSy procedure in 70 participants (55.6%) and within 2 hours in 36 participants (29.8%). In no participants did the pain persist more than 24 hours (Table 2). Following the HSG procedure 36 participants took paracetamol or other nonsteroidal anti-inflammatory drugs (NSAIDs) and 6 participants took pentazocine to control pain, and 8 participants took an antiemetic agent. Following the HyCoSy procedure, 48 participants took paracetamol or other NSAIDs and 3 participants took pentazocine to control pain, and 13 participants took an antiemetic agent (Table 1).