

# Pain evaluation during 3D hysterosalpingo-contrast sonography

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## Abstract

The evaluation of the tubal permeability for the infertile patient is the initial stage in the diagnostic conduct, practiced in the outpatient department, with minimally painful invasive intervention in the absence of the anesthetic support. Thanks to the technological advances of the equipment, as well as the finding of safe and more stable contrast media, the ultrasound procedure with contrast substance, hysterosalpingo-contrast sonography (HyCoSy), led to remarkable results in terms of concordance with laparoscopic chromoperturbation, exceeding hysterosalpingography in terms of sensitivity and specificity.

**Keywords:** hysterosalpingocontrast sonography, pain, infertility, tubal blockage

## Rezumat

Evaluarea permeabilității tubare la pacienta infertilă este o etapă inițială în conduita diagnostică și care, practică în ambulatoriu, presupune o intervenție minim invazivă dureroasă în absența suportului anestezic. Grație progreselor tehnologice ale aparatului, cât și găsirii unor medii de contrast sigure și cât mai stabile, procedura ecografică cu substanță de contrast, sonohisterosalpingografia (HyCoSy), a condus la obținerea unor rezultate remarcabile în ceea ce privește gradul de concordanță cu cromopertubația laparoscopică, depășind histerosalpingografia în ceea ce privește sensibilitatea și specificitatea.

**Cuvinte-cheie:** sonohisterosalpingografie, durere, infertilitate, obstrucție tubară

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## Evaluarea durerii la efectuarea sonohisterosalpingografiei 3D

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## Introduction

Repeated pelvic inflammatory disease (PID) is considered the main cause of tubal obstruction, the probability of developing infertility being up to 43% after three acute episodes<sup>(1)</sup>. Pelvic inflammatory disease can cause edema, adhesions, obstruction and dilation of the fallopian tube with fluid. This can impede the normal function of receiving oocytes from the tubal fimbria, which leads to fertility problems. Therefore, in the diagnosis of female infertility, the assessment of tubal permeability is mandatory. To assess tubal permeability, several tests are available, including hysterosalpingography (HSG), laparoscopy with a staining test, fertiloscopy, selective salpingography, and hysterosalpingo-contrast sonography (HyCoSy)<sup>(2)</sup>. HyCoSy is a noninvasive ultrasonographic procedure based on the introduction of a positive contrast fluid which increases the contrast of ultrasound in the uterine cavity and fallopian tubes that can be seen by transvaginal ultrasound. Despite the benefits, HyCoSy is definitely an operator-dependent process. Precise transverse probe movements are essential to identify the passage of fluid through the fallopian tubes during injection<sup>(3)</sup>. In addition, 2D HyCoSy does not provide the image of the fallopian tubes entirely, the potential tubular spasm can be confused with tubal occlusions, and the fluid or air-flow through the fallopian tubes can be misinterpreted due to bowel movements. 4D HyCoSy overcomes some of these limitations because it improves the visualization of the movement of the contrast medium in the fallopian tube<sup>(4)</sup>.

## Materials and method

From January 2019 to July 2019, a total of 15 infertile patients scheduled for minimally invasive surgery were selected. The inclusion criteria were as follows: proliferative phase of the menstrual cycle (days 5-10), no sexual contact or use of barrier methods during preprocedure, negative vaginal secretion cultures, negative urine culture, absence of vaginal bleeding. The exclusion criteria were: acute salpingitis or pelvic inflammatory disease, ultrasound-visible tubal pathology (hydrosalpinx), suspicious gynecological tumors, previous major surgery in the gynecological field. All ultrasound examinations were performed using GE Medical Systems ultrasound, Voluson E8 Expert ultrasound (equipped with dedicated 3D imaging software and CCI mode) and using a 5-9 MHz transvaginal probe. The detailed ultrasound examination was performed in longitudinal and transverse planes and any uterine, tubal and ovarian abnormalities were observed<sup>(5)</sup>. The contrast medium was a diluted sulphur hexafluoride solution. The statistical analysis was performed to assess the threshold of pain experienced by patients at different times of the ultrasonographic procedure if the fallopian tubes were permeable, obstructed or only one was functional. This was done by determining the numerical value of pain at the time of insertion and fixation of the Foley probe (T1), at the time of injection of the contrast agent (T2) and 30 minutes after the end of the procedure (T3). The analysis was performed later, after confirming the concordance between the results of the ultrasound test with the laparoscopic procedure.

**Table 1** The median pain value measured using NRS scale during the 3D HyCoSy procedure

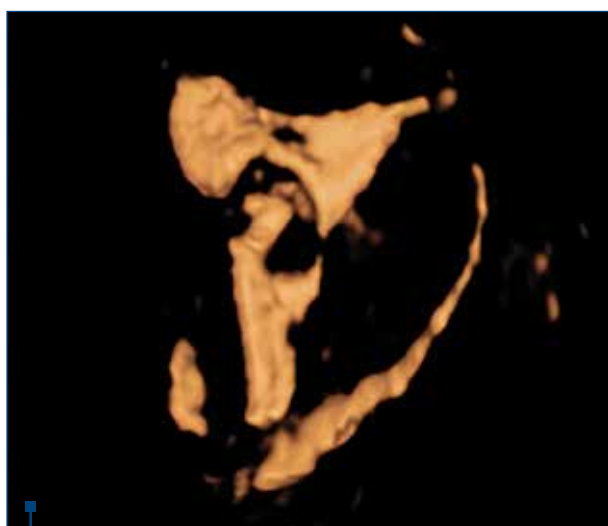
Characteristics	N – numeric value
<b>T1 median pain value</b>	<b>2 ± 1.41 (DS)</b>
Pain perception (T1)	
Absent (NRS 0)	3 (20%)
Mild (NRS 1-3)	11 (73.33%)
Medium (NRS 4-6)	1 (6.66%)
Severe (NRS 7-10)	0 (0%)
<b>T2 median pain value</b>	<b>4.6 ± 1.55 (DS)</b>
Pain perception (T2)	
Absent (NRS 0)	0 (0%)
Mild (NRS 1-3)	3 (20%)
Medium (NRS 4-6)	10 (66.66%)
Severe (NRS 7-10)	2 (13.33%)
<b>T3 Median Pain Value</b>	<b>1.33 ± 0.81 (DS)</b>
Pain perception (T3)	
Absent (NRS 0)	3 (20%)
Mild (NRS 1-3)	12 (80%)
Medium (NRS 4-6)	0 (0%)
Severe (NRS 7-10)	0 (0%)

The best known one-dimensional acute pain assessment tools are the visual analog scale (VAS), the numerical rating scale (NRS) and the verbal (four-point) scale (VRS). They work best for the patient's subjective feeling of pain intensity, and the first two, VAS and NRS, are superior to VRS. The patients were familiar with the use of the numerical instrument before starting the procedure, and the results were recorded and then classified according to the recommendations of Breivik et al. in four categories: 0 = the absence of pain; 1-3 = reduced pain; 4-6 = medium pain; 7-10 = intense pain. The NRS scale is also useful for VAS in the

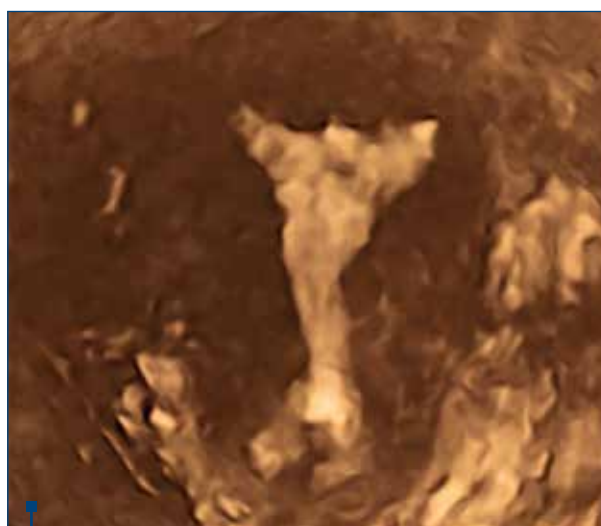
subjective assessment of acute pain, and can be used for up to 24 hours<sup>(6)</sup>. In the initial analysis, we took into account the establishment of the absolute numerical value, as well as the percentage of pain felt by patients at each moment of each procedural time, regardless of the test result, to identify for the studied group the general values of pain felt.

### Results

The pain was felt by all patients at different times. At 30 minutes after injection, all patients considered the procedure painless or with mild pain (NRS 0-3) – Table 1.



**Figure 1.** Unilateral patency



**Figure 2.** Bilateral obstruction

**Table 2** Procedure pain in different stages of the tubal testing

Procedure pain (primary or secondary infertility)	P (9)	S (6)
Median NRS value T1	1.88	2.16
Median NRS value T2	5	4
Median NRS value T3	1.44	1.16

**Table 3** Perception of pain in patients with varying degrees of ultrasound-evaluated tubal permeability (T2)

Pain perception	Tubal patency			
	Bilateral patency	Unilateral patency	Bilateral obstruction	Total
<b>Absent (0)</b>	0	0	0	0
<b>Mild (1-3)</b>	1	1	1	3
<b>Medium (4-6)</b>	6	3	1	10
<b>Severe (7-10)</b>	0	1	1	2
<b>TOTAL</b>	7	5	3	15

**Table 4** Comparative median pain score in relation with tubal permeability

Tubal permeability	T2 pain median (NRS) + standard deviations
Bilateral spillage	4 ±1
Unilateral spillage	5 ± 1.58
Bilateral obstruction	5.33 ± 2.51

When present, pain was described as uterine, abdominal cramps or menstrual-like pain (dysmenorrhea).

In the second part of the analysis, we divided patients according to secondary or primary infertility status. Thus, nine patients with primary infertility and six patients with secondary infertility were studied.

The conclusions of the obtained results are interesting. The pain felt at the time of T1 is significantly more intense in the group of patients with secondary infertility, which apparently seems peculiar, considering their history. The explanation may take into account the fact that often these patients had to use a Foley pediatric no. 8, compared to the value of 6, which was the size used especially in patients with primary infertility. The balloon was fixed with extra 0.5 ml more serum, in patients who had a history of second-trimester births or abortions to prevent backflow or elimination of the Foley catheter. Subsequently, the recorded values were similar in the two groups, both at the time of injection and at distance (Table 2).

In the last part of the study, we compared the scores obtained according to the patency tubal status, dividing the group into three subgroups: patients in whom both tubes had contrast passage, with a single permeable tube or bilateral tubal obstruction (Table 3 and Table 4).

From the demographic and clinical variables assessed, only the impairment of tubal permeability was significantly correlated with the pain felt during injection (T2) measured by the NRS scale. Regarding tubal obstruction, the mean pain scores were 4±1 for bilateral passage, 5±1.58 for

unilateral obstruction (Figure 1) and 5.33±2.5 for bilateral obstruction (Figure 2).

It was noted that the most intense pain occurred during the injection of the contrast solution, being mentioned by patients, in general, as of numeric value. This may be due in particular to the need to use an increased volume of solution in the 3D/4D procedure. Fortunately, at T3, 30 minutes after the end of the procedure, the pain was either absent or of low intensity, which confirms the opportunity to perform it in an outpatient setting, without the need for postprocedural medication. ■

**Conflict of interests:** The authors declare no conflict of interests.

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