Tubal Patency Assessment : A Comparison of Hysterosalpingo Contrast Sonography (HyCoSy) and Chromolaparoscopy

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Abstract : **Twenty nine fallopian tubes from 15 patients were examined for tubal patency using HyCoSy followed by chromolaparoscopy. The mean volume of contrast medium used was 14.3 ml and the duration of HyCoSy was 8.5 minutes. Concordance, sensitivity, specificity, positive predictive value and negative predictive value were 75.9, 44.4, 90.0, 66.7 and 78.3% respectively. The only adverse effect was mild pelvic pain and this was found in 60%. These results suggest that HyCoSy may become an established method for assessing fallopian tubal patency in the future.**

เรื่องย่อ : การประเมินสภาพท่อนำไข่เปรียบเทียบระหว่าง Hysterosalpingo Contrast Sonography (HyCoSy) และการฉีดสีขณะส่องกล้องตรวจภายในอุ้งเชิงกราน

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ทำการศึกษาประเมินสภาพท่อนำไข่ 29 ท่อ ของผู้ป่วย 15 ราย โดย HyCoSy เปรียบเทียบกับการฉีดสีขณะส่องกล้องตรวจภายในอุ้งเชิงกราน ปริมาณยาที่ใช้เฉลี่ยและเวลาเฉลี่ยของ HyCoSy เท่ากับ14.3 มิลลิลิตร และ 8.5 นาที ได้ผล concordance, sensitivity, specificity, positive predictive value และ negative predictive value 75.9, 44.4, 90.0, 66.7, และ 78.3% ตามลำดับ พบอาการปวดท้องเล็กน้อย เป็นอาการข้างเคียงร้อยละ 60 HyCoSy อาจเป็นวิธีใหม่ในการประเมินสภาพท่อนำไข่ในอนาคต

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INTRODUCTION

Tubal occlusion is a common cause of infertility and may be present in as many as 30% of all patients.[1] The number of cases of tubal infertility is slowly rising due to the increasing prevalence of salpingitis, the growing number of ectopic pregnancies, and the increasing frequency of microsurgical and laparoscopic interventions.[2] The conventional methods used for diagnosis of tubal disorders are X-ray hysterosalpingography (HSG) and laparoscopic chromopertubation (lap and dye). The disadvantages of HSG are that the gonadal tissue is exposed to radiation, there may be an allergic reaction to X-ray contrast media and the procedure requires special radiological staff and facilities.[3] Lap and dye permits the direct evaluation of tubes, ovaries and other pelvic organs but it is an invasive procedure with a risk of intraabdominal organ injury, and requires general anesthesia and hospitalization.[4]

In recent years, transvaginal salpingosonography with echogenic contrast medium (hysterosalpingo contrast sonography, HyCoSy) has been introduced as an alternative method for assessing tubal patency. It is an easy, well-tolerated and safe procedure.[5] The echogenic contrast medium used most frequently in this method is galactose based solution containing micro air bubbles (Ecovist, Schering). This acts as a strong acoustic scatter medium. In this study, we compare HyCoSy and conventional chromolaparoscopy in the assessment of tubal patency.

MATERIALS AND METHODS

Fifteen infertile women were examined for tubal patency by HyCoSy and chromolaparoscopy. The examination took place between September 1997 and August 1998. All patients had indications for laparoscopy. Those who had pelvic inflammatory disease (PID), lower genital tract infection, suspected pregnancy, abnormal uterine bleeding or had galactosemia were excluded from the study. HyCoSy was performed during the follicular phase of the menstrual cycle at least 24 hours before chromolaparoscopy was carried out by the same investigator.

All patients were examined in the dorsal lithotomy position. The patient's vulva and vagina were disinfected using Savlon. An intrauterine balloon catheter was introduced into the uterine cavity and inflated with 1-2 ml of air then pulled tightly against the inner cervical ring. Transvaginal B-mode ultrasound using a 6 MHz probe (Toshiba SSA - 220 A, Japan) was performed to assess the image quality of the pelvic organ. Echogenic contrast medium was injected slowly. A transection of the uterus was obtained by rotating the probe to locate the tubouterine junctions. The fallopian tubes were examined separately. Intratubal flow was observed during injection. Tubal patency was considered if (i) the emergence of contrast out of the fimbriae could be visualized or (ii) an intratubal flow of contrast medium was observed in all parts of the tube or (iii) there was unhindered flow of contrast medium at least in the intramural part of the tube for more than 10 seconds and a sactosalpinx could be excluded. The duration of the HyCoSy procedure was recorded from the beginning of the disinfection procedure to the removal of the catheter. Subsequent to HyCoSy, a laparoscopic chromopertubation was performed under general anesthesia to assess tubal patency, as well as status of the uterus, the ovaries and other pelvic organs.

RESULTS

Patients details are shown in Table 1. A total of 29 fallopian tubes from 15 patients were examined as one patient had a previous salpingectomy due to tubal pregnancy. The mean contrast medium volume used was 14.3 ml, and the mean duration of the procedure was 8.5 minutes.

Tubal patency was assessed by HyCoSy and by chromolaparoscopy (Table 2, 3). The overall concordance rate per tube was 75.9%, giving a sensitivity for HyCoSy detecting a patent tube as 44.4%, with a specificity of 90.0%, a positive predictive value of 66.7% and a negative predictive value of 78.3%. The only adverse effect was minor. Mild pelvic pain was found in 9 patients (60%) but none required any analgesic.

DISCUSSION

HyCoSy is a new technique, in that the number of gynecologists and infertility specialists who have used it is currently quite small. Echovist is an

Table 1. Background details

	Mean ± S.D.	Range
Patients age (years)	34.4 ± 5.4	25 - 44
Body weight (kg.)	55.0 ± 6.2	45 - 65
Height (cm.)	159.2 ± 4.5	153 - 170
Body mass index (BMI)	21.7 ± 2.1	17.6 - 24.3
Infertility period (years)	6.1 ± 4.3	2 - 16
Duration of HyCoSy (minutes)	8.5 ± 3.5	5 - 15
Volume of Echovist® used (ml.)	14.3 ± 3.7	10 - 25

Table 2. Comparison of HyCoSy and laparoscopy evaluations of the fallopian tubes

HyCoSy	Laparoscopy		Total
	Not patent	Patent	
Not patent	4	2	6
Patent	5	18	23
Total	9	20	29

Table 3. Diagnostic ability of HyCoSy comparing to laparoscopy

Diagnostic Measure	Results (%)
Concordance	75.9
Sensitivity	44.4
Specificity	90.0
Positive predictive value (PPV)	66.7
Negative predictive value (NPV)	78.3

echogenic contrast agent which can be used for the sonographic assessment of tubal patency. It is a suspension of soluble galactose microparticles in an aqueous galactose solution (20% w/v). The microbubble microparticle suspension acts as a strong acoustic scatter medium and then is completely absorbed. Inflammatory reactions were not observed in an initial clinical trial.

Laparoscopy with chromopertubation has both advantages and disadvantages. Advantages are possible assessment of fimbrial function and other pelvic organ pathology with the ability to correct this by laparoscopic surgery. Disadvantages are that it is invasive, and there is a risk of injury to abdominal organs. It costsmore and requires general anesthesia and hospitalization.[5] HyCoSy has many benefits. It is a reproducible procedure and gives a reliable assessment of tubal patency. X-ray exposure is avoid, and there is no need of anesthesia. The procedure is rapid and can be performed on outpatient; it is well tolerated and allow a real time demonstration of tubal patency to the patients. Its limi-

tations are possible misdiagnosis of tubal occlusion by tubal spasm, and possible misdiagnosis of tubal patency by tubal flow in sactosalpinx. It is not possible to visualize intrapelvic pathology and requires transvaginal ultrasound expertise.[5]

Satisfactory sensitivity, specificity and concordance compared with chromolaparoscopy have been reported in a number of studies. Concordance in these studies varied from 91.6% and 82.5% with Doppler sonography[6,7] to 84% with magnetic resonance image.[8] In our study, we found that the concordance of HyCoSy using chromolaparoscopy as the reference method was 75.9%. The relatively low sensitivity (44.4%) indicated that HyCoSy is not able to detect an occluded tube as accurately as chromolaparascopy. This might be due to the difficulty of sonographic interpretation or to tubal spasm. Difficulty in interpreting the sonographic picture was more commonly encountered in women with an increase body mass index (BMI), with an acutely retroverted or oblique uterine position, with ovaries situated either in closed proximity to the uterus or laterally in the pelvis, or in whom there were multiple loops of overlying gaseous bowel.[9] One major pitfall of hysterosalpingo-contrast sonography is the false diagnosis of a proximal occlusion of tubes, which may be due to a physiological tubal spasm or to tubal debris or light adhesion. To overcome these problems, techniques for selective tubal catheterization have been used.[10]

The only adverse effect of HyCoSy was a minor one, mild pelvic pain being found in 60% of patients. This might be due to overinflation of the catheter balloon and uterine distension during the contrast media injection. Factors increasing the pain level were the presence of at least unilateral tubal occlusion, difficulty in inserting the catheter, longer time of procedure and if the examination was performed close to the time of menstruation.

In conclusion, this study suggests that HyCoSy may become an established method to assess fallopian tubal patency. The method has fairly good correlation and good specificity but low sensitivity. Compared with chromolaparoscopy, it takes a shorter time, carries minimal risk and has only one minor adverse effect.

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