The value of sonohysterography in the diagnosis of tubal patency among infertile patients

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Valeur de l'hydrosonographie dans l'étude de la perméabilité tubaire chez les patientes infertiles

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R É S U M É

Prérequis : La pathologie tubaire est une des principales causes de la infertilité féminine.En pratique l'évaluation de la fonction des trompes est limitée à la perméabilité tubaire et aux adhérences péritubaires.

Buts: Evaluer la valeur de l'hydrosonographie dans l'évaluation de la perméabilité tubaire chez les patientes infertiles et comparer ses résultats avec l'hystérosalpingographie et la laparoscopie.

Méthodes : Dans cette étude prospective, 40 femmes ont bénéficié de trois méthodes consécutives d'exploration de la perméabilité tubaire: hystérosalpingographie, hydrosonographie et laparoscopie avec le test de colorant, dans un délai de 6 mois.

Résultats : L'âge moyen de nos patients était de 32 ± 05 ans. Parmi les 40 femmes qui ont été recrutés, 30 avaient une infertilité primaire et 10 avaient une infertilité secondaire. Au total, 80 trompes ont été examinées par ces 3 méthodes. L'hydrosonographie a montré la perméabilité tubaire dans 51cas (64%), l'hystérosalpingographie dans 47 cas (59%), et la laparoscopie dans le 52 trompes (65%) . Les résultats de l'hydrosonographie et de la laparoscopie étaient concordantes dans 70 des 80 trompes (concordance, 87,5%)

En ce qui concerne le statut des trompes à droite et à gauche, les résultats de l'hydrosonographie sont en accord avec la laparoscopie dans 75% et 87,5%, respectivement, tandis que l'hystérosalpingographie est en accord avec la laparoscopie dans 64% et 54% respectivement.

Conclusion : L'hydrosonographie est utile dans l'évaluation de la perméabilité tubaire en effet il s'agit d'une procédure simple, rapide et peu couteuse.

M o t s - c l é s

Hydrosonographie, hystérosalpingographie, infertilité, perméabilité tubaire, laparoscopie

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S U M M A R Y

Background: Tubal pathology is one of the main causes of infertility.In the routine fertility work-up, our ability to evaluate tubal function is limited to tubal patency and peritubal adhesions.

Aims: To assess the value of sonohysteroography (SHG) in evaluation of tubal patency in infertile patients and to compare its results with hysterosalpingography and laparoscopy.

Methods: In this prospective study, 40 consecutive women were underwent three methods of exploration of tubal patency: hysterosalpingography, sonohysteroography and laparoscopy with dye test, within a period of 6 months.

Results: The Mean age of our patients was 32 ± 5years. Of the 40 women who were recruited, 30 had primary and 10 had secondary infertility. Altogether 80 tubes were exanimated by these 3 methods. Sonosalpingography showed patency in 51(63.7%) tubes, hysterosalpingography in 47 (58.7%) tubes, and laparoscopy in 52 (65%) tubes. Sonosalpingography and laparoscopy agreed in 70 out of 80 tubes (concordance, 87.5%). As regards the appearance of the right and left tubes, the results of sonohysterography agreed with laparoscopy in 75% and 87.5%, respectively, while HSG agreed with laparoscopy in 64% and 54% respectively.

Conclusion: SHG is useful in the assessment of tubal patency and its implication in the fertility workup as a simple and fast procedure can minimize costes and abus of sophisticated techniques.

K e y - w o r d s

Sonohysterography, Hysterosalpingography, infertility, Tubal patency, Laparoscopy

Tubal factor is involved in 20-30% of infertile couple. This frequency is probably underestimated since most aspects of tubal dysfunction escape to clinical observation.
The fallopian tube is a difficult organ to be explored, because deep, small, tortuous and complex.
Aside from endoscopic diagnosis to evaluate the fallopian tube by endoscopic, the current technical reference for the assessment of tubal patency are hysterosalpingography(HSG) and laparoscopy-dye -test. Each has advantages and disadvantages. Sonohysterography (SHG) is a technique in which a sterile saline fluid is injected into the endometrial cavity to provide contrast at ultrasonography. This technique can be used for evaluation of tubal patency.
The trans vaginal ultrasound with contrast enhancement seems to be an attractive method in the study of tubal patency for reliable, reproducible, minimally invasive and inexpensive. It has its place in the couple's infertility.
The aim of our study is to assess the value of sonohysteroography (SHG) in the evaluation of tubal patency in infertile patients and to compare its results with hysterosalpingography and laparoscopy.

PATIENTS AND METHODS

We have performed a prospective study analyzing the results of 40 sonohysterographies in the department of gynecology and obstetrics B of the center of maternity and neonatology “La Rabta”.
This study covers a period of six months from 1 January to 30 June 2008.
40 infertile patients expressed their agreement with this study. This study was approved by the ethic committee of our institution. SHG and HSG were performed in all cases. A diagnostic laparoscopy is made as a result of these investigations; laparoscopy was performed within 15 days from the sonohysterography.
After a full history was taken, all women underwent a complete physical and pelvic examination to exclude pregnancy, vaginal, cervical, or pelvic infection, or of cervical stenosis, or vaginal bleeding.
Are included in the study:
Patients with primary or secondary infertility;
Patients who received the 3 procedures: HSG, SHG and laparoscopy. We chose a natural product simple and readily available: the sterile saline fluid.
The SHG procedure was performed early in the post menstrual period. After an initial evaluation of the uterus, endometrium, adnexae, and douglas pouch by vaginal ultrasound, a Cusco speculum was gently inserted and the cervix washed with an antiseptic solution. The anterior lip of the cervix was grasped with a single-toothed tenaculum and a pediatric Foley catheter (8 f-10f) was introduced into lower uterine cavity. A 20-ml syringe loaded with 0.9% saline solution was attached to the external end of the catheter after removal of the speculum and the tenaculum, and ultrasound probe was reintroduced into the vagina. Injecting 20 to 40 ml of the solution was introduced into the catheter with air so that air bubbles, which are highly echogenic, would facilitate checking the patency of the fallopian tubes. The patency of a tube was determinated by the passage of air bubbles through the tube and /or the presence of fluid in the corresponding paracolic gutter. Each tube was classified as definitely patent, definitely occluded, or inconclusive. All transvaginal ultrasound evaluations were performed using the LOGIQ 400 ultrasound system with a 7.5 MHZ transvaginal probe.
The duration of visibility of the passage along the tube must be greater than 5 seconds to confirm tubal patency. An important sign is the appearance in peritoneal fluid in the pouch of Douglas, proving at least unilateral tubal patency. The visibility of the passage of contrast ultrasound is much more selective on the side of tubal patency. The average time needed is approximately 20 minutes, setting up and removing the material included. Prophylactic antibiotics (3 g Amoxicilline for 7 days) were given to the patients. Laparoscopy was considered as the gold standard, the sensitivity, PPV, and NPV of HSG and SHG were calculated and compared with laparoscopic procedures, using cross-table analysis.
A Kappa score (K) indicates the level of agreement beyond chance: 0.0-0.2: slight agreement, 0.2-0.4: fair agreement, 0.4-0.6: moderate agreement, 0.6-0.8: substantial agreement, 0.8-1.0: almost perfect agreement.

RESULTS

Of the 40 women who were recruited, 30 had primary and 10 had secondary infertility. Mean age was 32 ± 5years (range, 23-44 years). Among 40 women, 26 gave no history suggestive of pelvic inflammatory disease, nor pelvic surgery. After completion of SHG, pain assessment was done using verbal pain scoring. The procedure was barely tolerable in 12 cases (30%), tolerable in 6 cases (15%) and acceptable discomfort in 22 cases (55%).no hospitalization was necessary. No complications attributable to SHG were detected. All women had undergone HSG, SHG and laparoscopy. Thus, altogether 80 tubes were examinated by these 3 methods. Sonosalpingography showed patency in 51(63.7%) tubes, hysterosalpingography in 47 (58.7%) tubes, and laparoscopy in 52 (65%) tubes. SHG and laparoscopy agreed in 70 out of 80 tubes (concordance, 87.5%). The tubal patency found in 51 tubes by SHG was confirmed by laparoscopy in 44 tubes (positive predictive value, 87.9%). A uni or bilateral tubal occlusion was observed in 28 patients by laparoscopy. In 8 tubes, occlusion suggested by sonosalpingography was not confirmed by laparoscopy and 7 tubes patent by sonosalpingography were found to be occluded by laparoscopy. There were 7 false positive and 8 false negative findings. The sensitivity of sonosalpingography in diagnosing tubal patency was 90% and the specificity 80%. The appearance of the right and left tubes using SHG agreed with HSG in 67.5% (K=0.28) and 62.5% (K= 0.23), respectively while HSG agreed with laparoscopy in 70% (K=0.33) and 57.5% (K=0.13) respectively (table 1) .However, when the appearance of patency of fluid in

Douglas pouch was considered as an indirect indicator of patency of at least one tube at SHG, the agreement with laparoscopy rose to 82.5%.

DISCUSSION

The useful screening test should have high estimates of both sensitivity and specificity. These properties of the test correspond to good diagnostic accuracy. Our study evaluated performance of SHG in diagnosis of tubal patency compared to laparoscopy and HSG. In this study, we used pediatric foley catheter because it is the most available and the cheaper. Romano and al performed vaginal SHG using the same catheter [1]. Darwish et al used the plastic Nelaton'catheter for injection [2]. Many distension media were used during SHG such as a microbubble-microparticule suspension in an aqueous monosaccharide carrier solution (Echovist) offering an excellent medium for amplifying the echo signal [3, 4]. However, it is an expensive medium not available in our country. In our study, we used saline solution 0.9% because it is sterile, available and cheap. According to our experience, the technical performance of SHG was easy reproducible and well accepted by patients, mild to moderate pain and pelvic discomfort were reported. A similar experience has been reported by other researchers [5-7]. Three studies, however, reported that patients had experienced severe pain and developed hypotension and bradycardia. Pain can be reduced with the use of different equipement, with a smaller bag and a constant injection pressure when filling the uterine cavity. As we experienced, and in order to provide sterile conditions and to reduce infective morbidity, prophylactic antibiotics were prescribed to all patients. Although small, our study had a stronger prospective value, with the sonographic evaluation performed just prior to laparoscopy and the dye test. Using the laparoscopic results as a reference, SHG agreed with laparoscopic in 72.2% and 72.7% for the right and left tubes, respectively. So, in our study, the positive predictive value for right tubal patency was high (93.1%), whereas the accuracy in finding out right tubal occlusion was somewhat lower (NPV 72.7%).However, the PPV for left tubal patency was 77.3%. This indicates that SHG is a reliable method to diagnose tube patency. These results are slightly inferior to previous studies, which have yielded concordance values between 83 and 86% [8, 9]. The concordance between laparoscopic and SHG was better in the assessments for the right tube patency. This agreement is explained by better viualization of the right side by a right-handed examiner, by starting of visualization of visualization of the right side at first and by the presence of more pathologic findings on the left side [10]. The results obtained from different studies are not, however, directly comparable, since some ones have reported the occurrence of bilateral or unilateral patency or bilateral occlusion. In our study we analyzed the tubes separately and screened the tubes only for patency or non-patency. Previously, only Spalding et al. have analyzed the tubes separately using similar equipment (11) (table 1).

CONCLUSION

From this study, we can consider SHG as a preliminary screening procedure at the early stage in tubal investigations, so that the patient could be rapidly scheduled for treatment or further exploration as necessary. We can, obviously, support the usefulness of SHG in the assessment of tubal patency because fast, simple, minimally invasive, safe and cheap technique without the risks of irradiations or general anesthesia. This may help save time and resources.

Table 1: Comparison of different tests in the study of tubal patency

	SHG versus LAPAROSCOPY			HSG versus LAPAROSCOPY		
	Right tubal patency	**Left tubal patency**	**Bilateral tubal patency**	**Right tubal patency**	**Left tubal patency**	**Bilateral tubal patency**
Sensitivity (%)	77.3%	90	80	63.6	70	55
Specificity (%)	72.2%	80	81.8	50	70	60
PPV (%)	77.3%	93.1	72.7	60.9	87.5	57.9
NPV (%)	72.2%	72.7	77.8	52.9	43.8	57.1
Concordance (%)	75%	87.5	75	57.5	70	57.5
Kappa	0.49	0.67	0.50	0.13	0.33	0.15

SHG: Sonohysterography; HSG: hysterosalpingography; PPV: positive predictive value; NPV: negative predictive value.

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