



ISSN NO. 2320-5407

Journal homepage: <http://www.journalijar.com>
Journal DOI: [10.21474/IJAR01](https://doi.org/10.21474/IJAR01)

INTERNATIONAL JOURNAL
OF ADVANCED RESEARCH

RESEARCH ARTICLE

SONOHYSTEROGRAPHY VERSUS LAPAROSCOPIC CHROMOPERTUBATION FOR THE ASSESSMENT OF TUBAL PATENCY IN INFERTILE WOMEN.

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Manuscript Info

Manuscript History:

Received: 17 March 2016
Final Accepted: 02 May 2016
Published Online: May 2016

Key words:

hysterosalpingography; infertility;
laparoscopy; sonohysterography;
tubal obstruction.

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Abstract

Objectives:- In this study, our goal was to determine the diagnostic value of SHG for the diagnosis of tubal obstruction by comparison of SHG and laparoscopic results.

Methods:- This study was based on the assessment of tubal patency by SHG and by the laparoscopy in 50 patients. All patients underwent HSG as a routine infertility workup, SHG was performed then laparoscopy was done subsequently.

Results:- patients with HSG findings are 21 of fallopian tube occluded (42.0%) and 29 patent (58.0%). Fifty patients underwent SHG. In 34 patients (68%), at least 1 fallopian tube was patent, and 6 patients (12%) were reported to have bilateral tubal obstruction. All 50 patient underwent laparoscopic evaluation its finding is 32 of fallopian tube are patent (64%) and 18 of fallopian tube are blocked (36%) 7 of patient of bilateral block and 1 of unilateral block

Conclusions:- Sonohysterography is not an accurate method for the determination of fallopian tube patency. but It is a simple, safe, and well-tolerated technique with a low risk of adverse effects and severe complications. laparoscopy is an accurate method for the assessment of fallopian tube patency.

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Infertility is defined as the failure of conception after 1 year of regular unprotected intercourse. It affects 10% to 15% of couples. (1). Main causes of infertility in women include anovulation, a tubal or peritoneal factor, and uterine, cervical, and unexplained infertility (2). The role of a tubal factor in infertility is increasing, and currently, it determines 30% to 35% of all infertility cases. (3) Morphological abnormalities and patency of the fallopian tubes can be visualized directly under laparoscopy, which is generally considered as the gold standard for the diagnosis of tubal pathology and other intra-abdominal causes of infertility (4,5). World Health Organization studies indicate that laparoscopy assess tubal patency better than HSG. (6,7). Sonohysterography can be made in an out-patient setting, and it is associated with minimal patient discomfort and a low risk of infection. This procedure is noninvasive and easy to be performed in almost any medical setting because it does not need sedation or anesthesia, nor does it have any adverse effects or severe related complications. (8) It has also been shown that SHG provides more precise and detailed information in evaluation of the uterus (9). The adverse effects of SHG is pain and vasovagal reactions. Stenosis of the cervix which is the most common cause of the SHG failure (10)

Patients and method:-

This prospective cross-sectional study was conducted at the department of Obstetrics and Gynecology, Benha University hospital during the period starting from February 2014 to Jan 2015. The study protocol was approved by

the Local Ethics Committee and written informed consents were taken before starting of the study .The study included 50 patients with primary and/ or secondary infertility recruited among those who were referred for combined laparoscopy / hysteroscopy during the course of infertility investigations .We exclude patients with acute sexually transmitted diseases., (PID). ,Abnormal uterine bleeding, Ascites .Pregnancy, Systemic disease contraindicating pregnancy ,Contraindications to laparoscopy. Sonohysterography then diagnostic laparoscopy were performed in the same sitting. Each procedure was done by the same operator to avoid inter observer variations. The procedures were performed during the follicular phase, 2 days after the last day of the menstrual period.

Sonohysterographic approach for assessment of tubal patency:-

Patients were initially placed on a gynecologic table in a lithotomy position. All patients were initially examined , and transvaginal sonography (Voluson, prov 730) was performed to exclude the presence of fluid in the cul-de-sac (retrotritone space) before SHG. .Speculum was inserted, and the cervix was visualized to ascertain the absence of any cervical disease or infection, and the vagina and the cervix were washed with a 10% povidone-iodine solution. A size 8 or 10 latex Foley catheter was inserted into the lower segment of the uterus, and the balloon of the catheter was inflated by 3 mL of sterile normal saline. The position of the balloon was verified by sonography. The speculum was then removed, and a transvaginal probe was inserted into the posterior vaginal fornix. Instillation of sterile saline through the Foley catheter using a sterile 20-mL syringe was subsequently performed under sonographic guidance. The collection of fluid in the cul-de-sac after the instillation of sterile saline was assessed by observation of the saline flow during the consequent transvaginalsonography which can detect the patency of unilateral or bilateral of fallopian tubes and also detect the presence of fluid in the cul-de-sac which is considered an indicator of patency of at least 1 or both of the fallopian tubes. Conversely, the absence of fluid in the cul-de-sac after the instillation of saline was interpreted as bilateral tubal obstruction. The absence/collection of the fluid was documented in the patient's records. Because no inter individual comparison of the collected fluid amount was intended as a part of the study assessments, no quantification criteria for the collected liquid were established.

Laparoscopic approach for assessment of tubal patency:-

The patient was placed in the dorsal lithotomy position to allow vaginal access for uterine manipulation. Diagnostic laparoscopy was performed under general anesthesia .Veress needle was inserted toward the hollow of the sacrum at a 45° angle. After a pneumo-peritoneum had been achieved with a Veress needle, the primary trocar with sleeve (5 mm in diameter) was placed at a similar angle to the Veress needle then 2 secondary trocars were placed. Inspection of the whole peritoneal cavity, uterus, tubes, ovaries, pouch of Douglas, urinary bladder, small and large intestines as well as the liver were done .Then laparoscopic dye chromotubation was performed to assess tubal patency bilaterally, by injecting methylene blue through the uterine catheter and observing spill through the fimbrial ends of the tubes. In case of negative spill, bluish discoloration and distension of the proximal part of the tube were noted. After diagnostic laparoscopy procedure Injectable analgesic and antibiotic will be given for 24 hours. All patient will be kept in the hospital for 24 hours for observation of vital signs and any possible complication.

Results:-

The study involved 50 infertile women. The mean age of the group was 27.88 ± 5.13 years. Duration of infertility in the studied group ranged between 3 and 7 years with a median of 4 years .the majority of cases with primary infertility 26cases(52%)Secondary infertility24cases(48%):Duration of infertility in the primary subgroup was not significantly different compared to the secondary subgroup ($p > 0.05$)Student's t test0.84

patients with HSG findings are21of fallopian tube occluded(42.0%)with bilateral block in 9tube(18%), unilateral block in 12tube(24%) and 29 patent(58.0%). Fifty patients underwent SHG. In 34 patients (68%), at least 1 fallopian tube was patent, and 6 patients (12%) were reported to have bilateral tubal obstruction. All 50 patient underwent laparoscopic evaluation its finding is 32of fallopian tube are patent(64%) and 18 of fallopian tube are blocked(36%) 7of patient of bilateral block and1of unilateral block.

Table 1: test performance parameters of the screening tests.

Screening test	Sensitivity (95% CI)	Specificity (95% CI)	PPV (95% CI)	NPV (95% CI)	Diagnostic accuracy (95% CI)	DOR (95% CI)
HSG	84% (66–94)	89% (64–98)	93% (76–99)	76% (52–91)	86% (73–94)	1.41 (0.83–2.41)
SHSG	75% (56–88)	44% (22–69)	71% (52–84)	50% (26–74)	64% (49–77)	1.41 (0.83–2.41)

Table 2: Association between SHSG findings and laparoscopy findings (n=50).

SHSG	Laparoscopy						(r) value	P value
	Bilateral block		Unilateral block		Bilateral patency			
	No.	%	No.	%	No.	%		
Bilateral block	2	28.6	8	72.7	24	75.0	0.271	=0.11
Unilateral block	4	57.1	1	9.1	1	3.1		
Bilateral patency	1	14.3	2	18.2	7	21.9		
Total	7	100	11	100	32	100		

the results of SHSG in relation to laparoscopy findings. SHSG diagnosed 28.6% of cases of bilateral block. In cases of bilateral tubal patency SHSG wrongly diagnosed 7 out of the 32 cases (21.9%).. Using Spearman correlation, the SHSG was not correlated well with laparoscopy with (r) value of 0.271 and a p values =0.11.

Table 3:- SHSG versus laparoscopy diagnosis of site of tubal block in 18 blocked tubes.

SHSG	Laparoscopy			
	Distal Block		Proximal Block	
	No.	%	No.	%
Distal Block	8	61.5	1	20.0
Proximal Block	5	38.5	4	80.0
Total	13	100	5	100
Kappa value	0.360*			

* Weak agreement of Kappa

Conclusions:-

The results of our study it appears that sonohystrography can be safe, simple but it is not reliable procedure in assessment of fallopian tube patency and when compared to hysterosalpingography the last is more specific and appears to be even more accurate in assessment of tubal patency. Both modalities, HSG and SHSG were not reliable for determination of the site of tubal occlusion and lack in diagnostic accuracy compared to diagnostic laparoscopy which therefore remains the gold standard in the investigations of tubal factors of female infertility

Discussion:-

Accurate evaluation of the uterine anatomy and fallopian tube patency is an essential step in a basic infertility assessment(11). HSG and laparoscopy are the 2 traditional examination methods in the estimation of tubal patency in infertile women, but in addition to the identified benefits, each method also carries the risk of severe adverse effects. Hysterosalpingography is an outpatient procedure, relatively inexpensive, does not necessitate general anesthesia, and is coupled with a therapeutic effect. Unlike laparoscopy, HSG enables a view within the uterine cavity and fallopian tubes. Nevertheless, this procedure is rather painful and is coupled with exposure to ionizing radiation and its related risks. Hysterosalpingography has a 5% rate of false positivity and a 60% rate of false negativity; hence, it is of intermediate sensitivity and of high specificity for fallopian tube obstruction(12) Laparoscopy is a more invasive procedure that requires general anesthesia. It is associated with the risk of accidental

injury of the intestine, urinary bladder, and pelvic vessels(13) but at the same time, this method provides valuable information about the pelvic anatomy that cannot be obtained during HSG. Sonohysterography can be provided in an outpatient setting, and it is associated with minimal patient discomfort and a low risk of infection. This procedure is noninvasive and rather easy to perform in almost any medical setting because it does not require sedation or anesthesia, nor does it have any adverse effects or severe related complications(14)It can be used as both a diagnostic tool and a therapeutic method in an infertile patient with tubal infertility SHSG showed concordance with diagnostic laparoscopy in 75.0% , while HSG showed concordance in 84.4% of cases .**In agreement with these results ;Exacoustoset al** which compared SHSG to HSG in assessing tubal patency, In relation to laparoscopic dye perturbation. The results of their study showed concordance between SHSG, HSG, and laparoscopy in 86.7% of cases. They concluded that SHSG had the advantage of being inexpensive, fast and well tolerated procedure that helped in determining tubal as well as uterine cavity status at the same time as conventional ultrasound scan was performed.(11). Other studies comparing sonohysterography alone to results of diagnostic laparoscopy. It included one hundred infertile women. Saline infusion sonohysterography agreed with laparoscopy in 83.3% of cases, which agrees with our study results (15) 86 patients under went sonohysterography using saline as contrast media, then they underwent laparoscopy and hysteroscopy. Sensitivity, specificity, positive and negative predictive value were 98.8%, 92.5%, 91.4% and 92% respectively for saline infusion sonohysterography (16) Other study compared laparoscopy, hysterosalpingo- sonography using air and saline as contrast media, and HSG in relation to the outcome of intrauterine insemination treatment Results showed clinical pregnancy rates per cycle of 14%, 18% and 18% in the laparoscopy, hysterosalpingo-contrast sonography, and hysteroqram groups respectively (17) HSG, SHSG and laparoscopy was performed in 40 women In 40 women with bilateral proximal tubal obstruction diagnosed with HSG, SHSG found bilateral tubal obstruction in 8 patients (20%). During laparoscopy bilateral tubal occlusion was confirmed in 6 patients(18) The study compare between SHSG after diagnostic Hysteroscopy and Laparoscopic Chromopertubation for the assessment of tubal patency study results were the presence of fluid in the pouch of Douglas was observed in 37 of the 56 cases. In 36 of these cases, unilateral or bilateral tubal patency was confirmed by DL. In 17 of the remaining 19 case .In contrary to the reported finding(19) **In contrary to the reported finding ; Bulletti CB** investigated the exclusion of pelvic factor of infertility through the same tests, namely SHSG, HSG and laparoscopy In their study endometriosis was diagnosed laparoscopically in 344 out of 1080women. Only 44 women (13%) with endometriosis showed bilateral tubal block(20) 68 infertile patients underwent hysterosonosalingography using saline as contrast medium, and then further assessment by laparoscopy and hysteroscopy were performed to them Sensitivity and specificity of hysterosonosalingography for the assessment of tubal patency was 100% and66% respectively. Negative predictive value was 100% and positive predictive value was 61%(21)There are study compared the three dimensional SHSG to diagnostic laparoscopy with chromopertubation in the assessment of tubal patency The sensitivity of three dimensional SHSG for detecting tubal patency was 100% with a specificity of 67%. The PPV,NPV were 89% and 100%, respectively. The concordance rate was 91%(22)**Hoffman et al** investigated the value of SHSG as a surrogate test of tubal patency in low resource settings. It included one hundred and thirteen patients who underwent saline infusion salpingosonography. Results were matched to results of hysteroqram or laparoscopy. There was an overall concordance of 82.5%, however, they concluded that sonography was more accurate at diagnosing patent tubes than blocked tubes, but was a well tolerated procedure (23)

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