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A COMPARISON OF HYSTEROSALPINGOGRAPHY AND LAPAROSCOPY IN THE INVESTIGATION OF INFERTILITY

Fouad Hamad Al-Dahhan[*] & Zainab Baker[@]

*FRCOG, Assistant Professor, [@]M.B.Ch.B. Department of Obstetric & Gynaecology, Basrah Maternity and Children Hospital, Basrah; IRAQ.

Summary

A comparative study of hysterosalpingography (HSG) and laparoscopy in the Investigation of infertility is presented. Laparoscopy with permeability testing was performed in 68 patients previously investigated by HSG. Complete history of factors that may predispose to tubal occlusion was obtained. Patients with problems of ovulatory failure or poor semen analysis that may contribute to their infertility were excluded. There was agreement between the two techniques in 19 (27.9%) of cases where both tubes were patent i.e. all the cases that identified to be patent in HSG, were patent in laparoscopy. Similarly, agreement between the two techniques in terms of bilateral blockage (26.4%), right tubal blockage in only (5.8%), and the left tubal blockage, there was (4.4%) agreement between two techniques. The overall agreement between the two methods was (64.5%) of cases. However, the diagnostic accuracy of the two methods differed significantly. It would appear that laparoscopic hydrotubation, despite its invasive nature has an edge in diagnostic accuracy when compared with HSG. It would be advantageous to subject patients in whom HSG has shown tubal blockage to laparoscopy or any of the newer techniques of hysteroscopy or sonographic hydrotubation.

Introduction

Since tubal pathology due to pelvic adhesive disease are believed to be responsible for 35-50% of infertile marriages[1-3]. Evaluation of tubal dys-function is of obvious importance in the investigation of female infertility.

Correspondence to:
Dr. Fouad H. Al-Dahan
Department of Obstetric and Gynaecology,
Basrah College of Medicine, Basrah; Iraq.

The two diagnostic procedures currently used for evaluation of tubal patency are hysterosalpingogram (HSG) and laparoscopic hydrotubation [3-4].

Each option has certain advantages, disadvantages, and limitations. Although HSG is accepted as a noninvasive procedure, it is performed without sedation or anesthesia and, therefore, the patient is not relaxed. Hence the rate of tubal spasm at the cornua and, therefore, false positive tubal blockage, is said to

be higher than usual occlusion. On the other hand, laparoscopy is an invasive procedure, is not without risks [5]. Various studies have been reported agreement of the two techniques with results varying from 55% to 76% [6-8].

Indeed, it has been reported that the only discrepancy between the two procedures lay in identification of peritubal adhesions at laparoscopy [9].

In this context, it seemed appropriate to report a comparative study of HSG and laparoscopy in identifying tubal blockage. Analysis of 68 patients with infertility in Basrah maternity & child hospital, in which both procedures were performed as part of their infertility evaluation. The results of the tubal patency tests with these two procedures were compared and analyzed statistically.

Patients and Methods

From 1997 to 2000, 68 infertile women who were investigated with both HSG and laparoscopy in Basrah Maternity and Child Hospital were included in the study. These women underwent diagnostic HSG, followed by laparoscopy within a period of six months as apart of their infertility work-up. All patients had a history of infertility for 36 months duration, whether primary or secondary, before being investigated.

For each patient, a complete history was taken, including the presence of any factor that may predispose to tubal occlusive disease especially with regards to past history of sexually transmitted disease. All patients with ovulatory failure or poor semen analysis were excluded from the study.

Hysterosalpingography was performed under sterile conditions and with the patient in lithotomy position, a speculum is introduced into the vagina and a Leech-Wilkinson cannula is introduced into cervix. The speculum is then removed, the patient carefully moved up the table, so that she lies in supine position, and the contrast medium is injected while the radiologist screens the procedure. Two films are necessary to show the cervical canal, the body of the uterus, the fallopian tubes, and the spread of contrast onto the peritoneum, 5-10 minute apart. Six to ten ml. of water-soluble contrast media usually is adequate for examination [10].

Findings charted from the films include tubal occlusion and its location, Whether proximal or distal, salpingitis isthmica nodosa, hydrosalpinx, fimbrial occlusions, spillage, whether free or loculated, and uterine abnormality such as Asherman's Syndrome, biconuate uterus, cervical incompetence, fibroid, adenomyosis among others. Whenever the tube was absent or not visualized, as in cases of spasm at the cornua or postasalpingoectomy for ectopic pregnancy, the tube was regarded as blocked ease analysis.

Laparoscopy with dye hydrotubation was performed in a fully equipped operating theater, under general anesthesia, and after adequate premedication. Laparosopic technique was standard [11]. Methylene blue dye was used for laparoscopic hydrotubation. In addition, to the observation of tubal patency with free spill of methylene blue in the peritoneum, the appearances of various pelvic structures (fallopian tubes, ovaries, uterus, peritubal flimsy adhesions, and other abnormalities) were evaluated. The results were analyzed and compared for both techniques using various statistical methods.

Results

The ages of the patients recruited in the study ranged from 20-40 years (mean 29.5 years). There was no significant relationship between patients' ages and tubal blockage, whether with HSG or laparoscopy. Similarly, social class,

type of infertility (primary or secondary), or location of tube (left or right) did not have any significant relationship with tubal blockage (Table I).

However, when tubal blockage was related to the possible associated causative factors, some relationship was found with both techniques.

Table II shows that 86% of cases of blocked tubes had a risk factor when tubal blockage was related to the possible associated factors, some relationship was found with both HSG and laparoscopy. Statistical analyses not done as a number of cases are few.

Tables III, IV and V show the distribution of tubal patency tests by HSG and laparoscopy as expressed in percentage of the total. Whereas HSG showed that both tubes were patent in 27.9% of cases, laparoscopy identifies both tubes as patent in 54.4% of cases. There was agreement between laparoscopy and HSG in only 27.9%. Similarly, agreement between the two methods in terms of bilateral tubal blockage was 26.4% of cases and, in terms of unilateral blockage, there was agreement in only 10.2% of cases (5.8% right, 4.4% left). All data were subjected to statistical analysis, there was an overall agreement between the two techniques in 64.5% of cases.

In table III a test of marginal homogeneity showed that the marginal proportions also differed significantly (P=0.01 and 0.05). This difference is brought out clearly when the various figures in the corresponding marginal proportions have been compared.

Table VI shows the additional pathologies observed at laparoscopy and HSG. In 20(29.4%) of cases there were abnormality on laparoscopy.

Pelvic adhesions (13.8%), ovarian cyst (2.9%), polycystic ovarian disease & endometriosis (1.4%), uterine fibroids (2.9%) were the commonest pathologies. Combinations of pelvic pathologies were observed also. As an advantage, HSG identified some other pathologies that were not identifiable by laparoscopy. There were no abnormalities found in 64 (94.1%) of cases. Irregular uterine cavity (1.4%), congenital uterine abnormalities (2.9%), and uterine fibroids in (1.4%) were the most common abnormalities found.

Parameter		HSG	Laparoscopy
Type of infertility	Primary	24 (48.9%)	15 (48.3%)
	Secondary	25 (51%)	16 (51.6%)
Age of the patients	15 - < 25	2 (4%)	2 (6.4%)
	25 - < 35	37 (75.5%)	23 (74.1%)
	35 - 40	10 (20.4%)	6 (19.3%)
Social class	Low	34 (69.3%)	20 (64.5%)
	Middle	11 (22.4%)	8 (25.8%)
	High	4 (8%)	3 (9.6%)

Table I Patients characteristics

Risk factor	Blocked	Non blocked	Total
Pelvic inflammatory disease	12 (85.7%)	2	14
Intrauterine contraceptive device	2 (66.6%)	1	3
Appendectomy	9 (81.8%)	2	11
Ectopic pregnancy	5 (100%)	0	5
oophorectomy	3 (100%)	0	3
Total	31 (86%)	5	36

Table II Relationship between risk factor and blocked tubes whether bilateral or unilateral.

State of the tubes	HSG	Laparoscopy	P-value
Both patent	19 (27.9%)	37 (54.4%)	< 0.01
Both blocked	37 (54.4%)	18 (26.4%)	< 0.01
Right blocked	9 (13.2%)	8 (11.7%)	> 0.05
Left blocked	3 (4.4%)	5 (7.3%)	> 0.05
Total	68	68	

df = 2 , X^2 = 12.389 P < 0.01

Table III.State of tubes as assessed by HSG and laparoscopy

State of the tubes	HSG	Laparoscopy	Both
Both patent	19 (27.9%)	37 (54.4%)	19 (27.9%)
Both blocked	37 (54.4%)	18 (26.4%)	18 (26.4%)
Right blocked	9 (13.2%)	8 (11.7%)	4 (5.8%)
Left blocked	3 (4.4%)	5 (7.3%)	3 (4.4%)
Total	68	68	46 (64.5%)

df = 4 , X2 = 13.489 P < 0.01

Table IV. Comparative accuracy between HSG and laparoscopy

		Hysterosalpingography				
Laparoscopy	**State of the tubes**	**Both patent**	**Both blockage**	**Right blockage**	**Left blockage**	**Total**
	Both patent	19 (27.9%)	13 (19.1%)	5 (7.3%)	0	37 (54.4%)
	Both blockage	0	18 (26.4%)	0	0	18 (26.4%)
	Right blockage	0	4 (5.8%)	4 (5.8%)	0	8 (11.7%)
	Left blockage	0	2 (2.9%)	0	3 (4.4%)	5 (7.3%)
	Total	19 (27.9%)	37 (54.4%)	9 (13.2%)	3 (4.4%)	68

Table V. Distribution of tubal patency test by HSG and laparoscopy as expressed in percentage of total.

Laparoscopic Findings	No. (%)
Endometriosis	6 (8.8%)
PID	9 (13.8%)
Fibroid	2 (2.9%)
Retroverted uterus	1 (1.4%)
Endometriosis and polycystic ovaries	1 (1.4%)
Ovarian cyst and adhesion	1 (2.9%)
HSG FINDINGS	
Endometrial adhesions	1 (1.4%)
Congenital uterine abnormalities	2 (2.8%)
Uterine fibroids	1(1.4%)

Table VI. Other pathologies observed at laparoscopy and HSG as expressed in percentage of total

Discussion

Tubal disease or obstruction remains a major cause of infertility [29]. The two diagnostic procedure currently used for evaluation of tubal patency are hysterosalpingography (HSG) and laparoscopic hydrotubation [3], each option has certain advantage, disadvantages and limitations[30]. Both laparoscopy and HSG have been reported to show agreement in 75% of cases [12-14]. Indeed, it was postulated that the only discrepancy between the two methods lay in the identification of some peritubal adhesions at laparoscopy[13-14].

Although HSG is accepted as noninvasive procedure, it is performed without any sedation or anesthesia, but has a high false positive and negative rate [31].

The results of the present study, showing an overall 64.5% agreement (27.9% patency26.4% bilateral blockage and 10.2% unilateral blockage) which is different from that reported by Adelusi [30] who found that both tubes were patent in 62%, both blocked in 22% and one blocked in 27% of cases. This difference probably due to larger sample size in the *Adelusi* study, but in both studies the differences between HSG and laparoscopy were statistically significant regarding both tubes patent and both tubes blocked (P>0.01).

In comparing the similarity of findings in both HSG and laparoscopy (agreement) with respect to both tubes were patent, we found that it was only 27.9%, i.e. all the cases 100%, that identified to be patent by HSG, were patent by laparoscopy. This result is similar to that reported by Opsahl [32] which was 96.6%, both these results were higher than that reported by Adelusi (80%).

On the other hand, when HSG and laparoscopy blocked both tubes, we found that on HSG 19.1% of cases had bilateral tubal blockage and 4.8% of cases had right tubal blockage. Whereas laparoscopy was able to identify both tubes were patent in these cases. This is similar to most studies that found the false positive results in about 25% of cases [31]. This could be due to tubal spasm or plug that can be eliminated under possibly high pressure normal saline infusion in anesthetized patient during laparoscopy [13], or due to faulty technique because the HSG done by radiologist [19,31].

Although there was overall agreement of 64.4% in this study, similar to those of other studies (Adelusi [30] 62.5%, Vasiljevic[33] 65% and Mark[34] 77%).

In addition, the advantages of laparoscopy is identified by the possibility of visualization of some other pelvic abnormalities which may be the cause of infertility like pelvic adhesion and endometriosis [33].

In this study pelvic adhesions was diagnosed during laparoscopic examination in 32% of cases which is higher than that reported by Adelusi 20% but lower than that of Adamson [35] 42%, this diagnosis could not be made by HSG examination. The difference in these rates could be due to the difference in incidence (prevalence) of pelvic inflammatory disease or endometriosis as a common cause of pelvic adhesions. It would appear from these results that laparoscopic hydrotubation, despite its invasive nature, has an edge in its diagnostic accuracy as compared with HSG. The added advantage of visualization of other intrapelvic pathologies that may be the cause of infertility in many instances, especially with regards to intrapelvic adhesions, polycystic ovarian disease, and endometriosis, would tend to favor the use of laparoscopy in the evaluation of tubal patency. Fortunately two patients of peritubal adhesion, adhesiolysis were performed during the laparoscopical examination and they conceived after 2 and 3 months. Because HSG is as old as

infertility investigation itself, the use of laparoscopic hydrotubation should be perform only in those patients in whom HSG has demonstrated tubal blockage. Whenever HSG has demonstrated tubal patency with free flow of dye, subjecting the patient to laparoscopic hydrotubation again may not be necessary. However, the newer methods of hysteroscopy and sonographic hydrotubation[15,16] also may be used in the evaluation of tubal patency in the infertile women. Indeed, this is more so in those women in whom HSG has indicated that the tubes are blocked, so as to enhance the accuracy of tubal patency.

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