

Comparison of hysterosalpingography and laparoscopy in the evaluation of infertile women

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ABSTRACT

الأهداف: مقارنة العوامل البوقية البيريتونية لدى النساء العقيمات بواسطة تصوير الرحم والبوقين إشعاعياً (HSG) وتنظير البطن.

الطريقة: أجريت دراسة تم فيها تقييم 82 حالة عقم على التوالي، وذلك بواسطة تنظير البطن لمدة ثلاثة أشهر عقبها إجراء تصوير الرحم والبوقين إشعاعياً (HSG)، بقسم أمراض النساء والولادة مستشفى جامعة دايكل التعليمي - بمدينة ديار بكر - تركيا، خلال الفترة ما بين مارس 2004م وحتى أبريل م. تمت مقارنة نتائج (HSG) وتنظير البطن.

النتائج: تمت مراقبة النتائج المرضية لدى 82 امرأة عقيمة شملتها الدراسة في (45.1%) بواسطة تصوير الرحم والبوقين إشعاعياً (HSG)، أما (54.9%) المتبقيات لم يكن لديهن نتائج مرضية. تم تقييم الحالات بواسطة فحص تنظير البطن، كما تم مراقبة الحالات لدى (65.85%) و (34.15%) لم يكن لديهن نتائج مرضية. اكتشفت النتائج المرضية بواسطة تنظير البطن لدى 20 مريضة من أصل 45 (44.4%) واللواتي لم يتبين لديهن نتائج مرضية بواسطة (HSG). كما لم يتم اكتشاف وجود نتائج مرضية لدى 3 مريضات من بين 37 مريضة (8.1%) اللواتي كان لديهن نتائج مرضية بواسطة (HSG). كشف تنظير البطن عدم وجود نتائج مرضية لدى 6 مريضات من بين 35 مريضة اللواتي أجري لهن فحص الأمراض البوقي بواسطة (HSG) بلغت الحساسية والمحدودية لتصوير الرحم والبوقين إشعاعياً (HSG) (63%) و (89.3%) على التوالي. كانت قيمة التنبؤ الإيجابي والسلبي لتصوير الرحم والبوقين إشعاعياً (92%) و (55%) على التوالي وكان معدل الدقة (72%).

خاتمة: تبين أن تنظير البطن طريقة عليا من أجل البحوث في الأمراض البوقية وأمراض الحوض في تقييم العقم. ولكن تعتبر طريقة (HSG) إقتصادية أكثر، وطريقة بدائية مناسبة في تقييم أمراض بطانة الرحم والبوقين، كما ويعتبر تنظير البطن طريقة ملائمة في فحص الجزء الخارجي للبوق، الأهداب المخملية، الصلة بين البوق والمبيض، إنتباذ بطانة الرحم، والإلتصاقات والأمراض الأخرى. لذلك، فإن هاتان الطريقتان غير بديلتان ولكنهما إلزاميتان لبعضهما.

Objective: To compare tuboperitoneal factors of infertile women by hysterosalpingography (HSG) and laparoscopy.

Methods: In this cohort study, 82 infertile cases were evaluated retrospectively by laparoscopy, 3 months

subsequent to HSG in the Department of Gynecology and Obstetrics, Medical School of Dicle University, Diyarbakir, Turkey, between March 2004 and April 2006. The findings of HSG and laparoscopy were compared.

Results: Out of the 82 infertile women, pathological findings were observed in 45.1% by HSG, and 54.9% had no pathological finding. On laparoscopic evaluation, however, pathological findings were observed in 65.85%, and 34.15% had no pathological findings. The pathological findings were detected by laparoscopy in 20 of the 45(44.4%) patients who had no pathological findings by HSG, and no pathological findings were detected by laparoscopy in 3 of the 37 (8.1%) patients who had pathological findings by HSG. Laparoscopy revealed no pathological findings in 6 of the 35 patients who had tubal pathology by HSG. The sensitivity of HSG was 63%, specificity was 89.3%, and the positive predictive value was 92%, with a 55% predictive value, and the accuracy ratio was 72%.

Conclusion: Laparoscopy is a superior method for the research of tubal and pelvic pathologies in the evaluation of infertility. However, HSG is a more economical and elementary method suitable for evaluation of endometrial and tubal pathologies, and laparoscopy is an appropriate method for examining the external part of tubae, fimbriae, the relation of tuba and ovary, endometriosis, adhesions, tuberculosis, and other pathologies. Therefore, these 2 methods are not alternative, but complementary.

Saudi Med J 2008; Vol. 29 (9): 1315-1318

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Received 26th April 2008. Accepted 19th August 2008.

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Infertility is defined as a failure of developing pregnancy without contraception within a one year period.¹ It affects 10-15% of couples in the reproductive period.² The tuboperitoneal factors are responsible for 25-35% of female infertility.³ In these cases, heterosalpingography (HSG) and laparoscopy are used for uterine and tuboperitoneal pathologies. The most appropriate period for application of HSG is between the 6th-11th days of the menstrual cycle, however, it can be practiced at any time, except during the menstrual period. The uterine cavity, tubae, and peritoneum are visible fluoroscopically by spreading an opaque material. Pelvic infection, anaphylaxis, and embolism may develop or radio opaque material may invade into the uterine wall or intravascular region. In the presence of excessive hydrosalpinx, the tubal wall may become thinner, and therefore, high pressure injection of radio opaque material may lead to tubal rupture and hemorrhage. All patients must be informed of the procedure, and if necessary, sedative and antispasmodic therapy must be used. Laparoscopy is usually applied with the assistance of general anesthesia, however, regional and local anesthesia is an alternative method. The abdominal and pelvic anatomy can be evaluated laparoscopically, and subsequently chromopertubation is utilized by indigo Carme or methylene blue. The solution should be injected into the uterine cavity, and fimbriae must be observed to detect the presence of sacculation, phimosis, and to see the currency of solution across the fallopian tubes. Pelvic pain is the most frequent complication of laparoscopy due to irritation by carbon dioxide gas. The wound of vessel perforation and trauma of bowel, uterus and bladder, emphysema of subcutaneous tissue, peritoneum, omentum or mediastinum, and other complications of anesthesia may be less frequently seen. Our aim is to compare the tuboperitoneal factors of infertile women by HSG and laparoscopy.

Methods. Eighty-two cases that were followed up for infertility were evaluated retrospectively in the Department of Gynecology and Obstetrics, Medical School of Dicle University, Diyarbakir, Turkey, between March 2004 and April 2006. The findings of HSG and laparoscopy were compared. Hysterosalpingography was performed in the Radio Diagnostic Department between the 6th and 11th days of menstrual cycle. The uterine position was determined by pelvic examination. The hystero-graph was placed into the cervical canal, and the radio opaque material was dissolved in 10-20 cc water, and was injected into the uterine cavity slowly by the assistance of fluoroscopy. An x-ray examination was performed twice: first, in the filling period of the uterine cavity by contrast material, and second in the spreading period of the abdomen. If

necessary, 3 or more x-ray examinations were carried out. Laparoscopy was performed by general anesthesia 3 months subsequent to HSG. All preparations for operation were completed. Verres needle was placed into the intra-abdominal cavity through the inferior umbilical incision, and it was pulled out subsequent to pneumoperitoneum being obtained. A trocar (10 mm) was inserted in the same region. The cannula of the trocar was left, and the trocar was pulled out, then a laparoscope was transmitted through the cannula. The upper abdomen was observed and subsequently, pelvic anatomy was examined in the Trendelenburg position. Atraumatic grasper forceps were used by the assistance of a second trocar (5 mm) for better visualization. A third trocar was applied, if required. Another uterine manipulator was used to deliver 5% methylene blue to determine the tubal canal patency.

Statistical analysis. The mean values were calculated for continuous variables. The quantitative observations were indicated by frequencies and percentages. The diagnostic markers (sensitivity and specificity) of HSG were calculated. Chi-Square test with Yates correction was used to analyze the categorical variables, shown with cross tabulation. Two-sided $p < 0.05$ was considered statistically significant. Statistical analyses were carried out by using the Statistical Package for Social Sciences version 15.0 for Windows (SPSS Inc., Chicago, Illinois, USA).

Results. Patients were classified according to primary (n=53), or secondary infertility (n=29). The ratio of primary infertility was 64.6%, and secondary infertility was 35.4%. Patients were between 19-42 years old, and the mean age was 29.3. The duration of infertility was between 1-26 years, and the mean duration of infertility was 6.9 years. Out of the 31 patients with tubal pathology, 11 had unilateral, and 18 patients had bilateral tubal obstruction. The remaining 2 patients had bilateral hydrosalpinx. Uterine pathology was detected in 6 (7.3 %) patients in which, 4 patients had uterus unicornis, one patient had uterus septus, and one patient had uterus arcuatus. Of the 82 infertile cases according to HSG, 45 (54.9%) had normal diagnosis, 31 (37.8%) had tubal pathology, and 6 (7.3%) had uterine pathology. The laparoscopic pelvic findings in infertile cases are shown in Table 1. In Table 2, the comparison of tubal patency according to HSG and laparoscopy was presented.

Adnexial adhesions were observed in 31 patients (37.8%). Eighteen out of 53 patients with primary infertility (34%), and 13 out of 29 patients with secondary infertility (44.8%) had adnexial adhesions. Thirteen patients (41.9%) had minimal adhesion, 11 patients (35.5%) had mild adhesion, 4 patients (12.9%)

Table 1 - Laparoscopic pelvic findings of infertile cases.

Diagnosis	Number of cases (%)	
Normal	28	(34.2)
Tubal pathology	33	(40.2)
Ovarian cyst	1	(1.2)
Uterine pathology	4	(4.9)
Endometriosis	9	(11)
Pelvic inflammatory disease	2	(2.4)
Mixed	5	(6.1)
Total	82	100

Table 2 - Comparison of tubal patency according to hysterosalpingography and laparoscopy.

Hysterosalpingography	Laparoscopy			Total
	Bilateral tubal patency	Unilateral tubal patency	No tubal patency	
Bilateral tubal patency	47			47
Unilateral tubal patency	2	14		16
No tubal patency	4	1	14	19
Total	53	15	14	82

Table 3 - Correlation of adnexial adhesion and endometriosis with tubal patency.

Findings	Laparoscopy			Total
	Bilateral tubal patency	Unilateral tubal patency	No tubal obstruction	
Adnexial adhesion stage I	7	4	2	13
Adnexial adhesion stage II	8	1	2	11
Adnexial adhesion stage III		1	3	4
Adnexial adhesion stage IV	1	1	1	3
Endometriosis stage I	3	1		4
Endometriosis stage II	3	1		4
Endometriosis stage III		1		1

Table 4 - Distribution of laparoscopic and hysterosalpingographic (HSG) findings.

HSG	Laparoscopy		Total
	Pathologic	Normal	
Pathologic	34	3	37
Normal	20	25	45
Total	54	28	82

Sensitivity - 63%, specificity - 89.3%, $\chi^2=18.27$, $p<0.001$

had moderate adhesion, and 3 patients (9.7%) had severe adhesion. Minimal and mild adhesions were dominant, and moderate or severe adhesions were less frequently observed in secondary infertile cases. No significant correlation was observed between duration of infertility and severity of adnexial adhesions. Endometriosis was detected in 6 patients (11.3%) with primary infertility, and 3 patients (10.3%) with secondary infertility. Minimal endometriosis was observed in 4 (44.4%), mild in 4 (44.4%) and moderate in one (11.1%) patient (Table 3). The distribution of laparoscopic and hysterosalpingographic findings are shown in Table 4. According to the results in Table 4 in which student's t-test was used, sensitivity, specificity, positive predictive value, negative predictive value, and correction ratio of HSG were determined. The sensitivity of HSG was 63%, and specificity was 89.3%. Positive predictivity was 92%, negative predictivity was 55%, and accuracy value was 72%. Yates corrected Chi-Square ($\chi^2=18.27$) test was applied. The statistically significant dominance of laparoscopy to HSG was observed in diagnostic evaluation of infertility ($p<0.001$).

Discussion. Recently, the role of HSG in the evaluation of infertility has become a matter of discussion. Hysterosalpingography is frequently used in the examination of the uterine cavity and tubal patency for patients with infertility. Diagnostic laparoscopy with advanced laparoscopic techniques that enhances its popularity, plays an important role in the evaluation of infertility. However, it was reported that examination of infertility without diagnostic laparoscopy is inadequate.⁴ Gherzi,⁵ in accordance to a personal experience over the last 10-year period reported that indications of laparoscopy have been enhanced. Cundiff et al⁶ had performed laparoscopy in 132 infertile women, 17±1.5 months subsequent to HSG, and reported that HSG should be the primary procedure when therapeutic potential of HSG was taken into account.

In a study from Nigeria of 110 women that underwent HSG and laparoscopy, pelvic pathology was detected in 48 patients. Subsequently, 48 patients underwent laparotomy for comparing the findings of HSG and laparoscopy. Laparoscopy was carried out prior to diagnosis of non tubal factors and proximal tubal obstruction ($p<0.002$). It was concluded that laparoscopy must be the first step procedure in the evaluation of infertility.⁷ Diagnostic potentials of HSG and laparoscopy were compared in a study including 420 patients in North Carolina, USA, and it was claimed that HSG is sufficient as laparoscopy in the diagnosis of tubal patency and obstruction, however, laparoscopy was superior in the examination of peritubal adhesions and other pelvic pathologies.⁸

Lavy et al⁹ concluded that it is unnecessary to apply laparoscopy if hysterosalpingographic examination is normal, or reveals suspicious unilateral tubal obstruction, and therapy scheme does not alter in 95% of patients. However, laparoscopy is more beneficial for the patients with suspicious bilateral tubal pathology, and alters therapy scheme. Predictivity of HSG for the evaluation of peritoneal factors of infertility was calculated in 756 patients from the USA. Despite the fact that predictivity of HSG is sufficient for severe pelvic disease, it is inadequate if the findings of HSG are suspicious. Diagnostic laparoscopy is indicated if the findings of HSG are normal or suspicious though, so HSG has negative predictivity in the presence of normal findings.¹⁰ Ismajowich et al¹¹ compared laparoscopy and HSG in the diagnosis of peritubal adhesions, and stated that HSG has higher false positive and negative results.¹¹

Since the study was carried out retrospectively, all of the cases at the department were included. In our study, factors responsible for intracavitary or intratubal obstruction, and the level of obstruction in the tubal passage could not be determined by chromopertubation applied during laparoscopy. Peritubal lesions and pathologies related to distal tubal occlusions are considered tubal factors in the laparoscopic examination. It is concluded that HSG must be the first diagnostic procedure for endometrial and intratubal lesions when therapeutic potential of HSG is taken into consideration. Furthermore, HSG is a simple and economical method. Laparoscopy is a standard method for the diagnosis of pelvic adhesion and endometriosis, as no other imaging techniques has the same sensitivity and specificity as laparoscopy.¹²

Our study emphasizes the opinion that examination of infertility due to pelvic adhesion and endometriosis is inadequate without laparoscopy, as reported in recent reports. The results of laparoscopy were similar to HSG in 47 patients with bilateral tubal patency in our study, however, laparoscopy revealed tubal patency in 2 of the 16 patients with unilateral tubal obstruction laparoscopy, confirmed tubal obstruction in 14 of the 19 patients with bilateral obstruction as determined by HSG. Examination by HSG to detect tubal patency was satisfactory. However, some factors such as cornual spasm were held responsible for false positive tubal obstruction detected by HSG, which laparoscopy confirmed tubal patency for the same cases. Laparoscopy is admitted as a more suitable method to observe pelvic pathologies and to exhibit tubal patency as a result of 48.8% ratio, to detect adnexial adhesion or endometriosis. Both

HSG and laparoscopy play an important role in the evaluation of infertility. Hysterosalpingography is one of the first steps in diagnostic procedures to detect tubal patency and intrauterine pathologies or abnormalities.

It is concluded that laparoscopy is a superior method for research of tubal and pelvic pathologies in the evaluation of infertility. However, HSG is a more economical and elementary method suitable for evaluation of endometrial and tubal pathologies. Therefore, these 2 methods are not alternative, but complementary to each other.

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