



Hysterosalpingography for Diagnosing Tubal Patency in Infertile Women

İnfertil Kadınlarda Tubal Patensi Değerlendirilmesinde Hysterosalpingografi Kullanımı

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Abstract

Objective: Tubal obstruction is one of the most common causes of female infertility. While laparoscopy (LS) is the gold standart method for assessing the patency of the tubes, hysterosalpingography (HSG) is widely used as a first-line approach in infertility work-up. The aim of this study was to compare HSG and LS in assessment of tubal patency.

Materials and Methods: Patients who underwent HSG, followed by LS for primary and secondary infertility between January 2015 and June 2017 were retrospectively analyzed. The laparoscopic findings were accepted as reference standard to calculate the diagnostic accuracy of HSG for tubal patency.

Results: A total of 67 patients were included into the analysis. The sensitivity, specificity, positive and negative predictive values of HSG for bilateral tubal patency were 82%, 75%, 91% and 57%, respectively. The sensitivity, specificity, positive and negative predictive values of HSG for bilateral tubal obstruction were 62%, 93%, 55% and 94%, respectively.

Conclusion: Our findings showed that HSG has high validity, on predicting tubal patency in particular. Laparoscopy should be used in patients with HSG showing nonpatency.

Keywords: Infertility, Laparoscopy, Hysterosalpingography, Tuba

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Öz

Amaç: Tubal oklüzyon, kadın fertilitesinin en sık görülen sebeplerinden biridir. Tubal açığının değerlendirilmesinde laparoskopı altın standart iken, hysterosalpingografi (HSG) de infertilite araştırmasında ilk basamak testi olarak uygulanır. Bu çalışmanın amacı, tubal patensiyi değerlendirmede HSG ve laparoskopide saptanan bulguları karşılaştırmaktır.

Gereç ve Yöntemler: Hastanemizde, Ocak 2015-Haziran 2017 tarihleri arasında primer veya sekonder infertilite nedeniyle HSG çekilen ve takiben laparoskopi yapılan hastaların dosyaları retrospektif olarak araştırıldı. Laparoskopik bulgular referans olarak kabul edilerek, HSG'nin tubal patensideki tam gücü hesaplandı.

Bulgular: Çalışmaya toplam 67 hasta dahil edildi. Laparoskopı altın standart olarak değerlendirildiğinde, HSG'nin bilateral tubal patensiyi değerlendirmede sensitivitesi %82, spesifisitesi %75, pozitif prediktif değeri %91, negatif prediktif değeri ise %57 olarak bulundu. Aynı değerler, tubal patensi izlenmeyecek hastalar için, sırasıyla, %62, %93, %55 ve %94 olarak bulundu.

Sonuç: HSG'nin, özellikle tubal patensiyi göstermede yüksek doğruluk oranına sahip olduğu bulunduğu bulundu. Tubal obstrüksiyon gösteren HSG'si olan kadınlarda laparoskopı kullanılmalıdır.

Anahtar Kelimeler: İnfertilite, Laparoskopi, Hysterosalpingografi, Tuba.

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Introduction

Tubal factor infertility is one of the most common cause of the infertility, causing 30-40% of female infertility(1,2). Laparoscopy (LS) with tubal dye instillation is considered as the gold standard method for diagnosing tubal pathology(3). However, LS is more expensive and invasive procedure compared to hysterosalpingography (HSG).

HSG has widely been accepted as the first choice tubal patency test in infertility work-up(4). The diagnostic accuracy of HSG has been studied for a long time. It was shown that HSG has a moderate sensitivity and positive predictive value (PPV) and high negative predictive value (NPV) for assessing tubal patency(5). Thus, further evaluation such as LS is commonly used when an HSG demonstrates nonpatency. However, LS may be abandoned when HSG shows bilateral tubal patency.

The aim of this study was to compare HSG and laparoscopic findings and to assess the diagnostic accuracy of HSG on tubal patency.

Materials and Methods

This retrospective study was conducted at the Department of Obstetrics and Gynecology of Health Science University, Suleymaniye Maternity Training and Research Hospital, Istanbul, Turkey. Patients who underwent HSG and LS for primary or secondary infertility between 01/2015 and 06/2017 were evaluated. The data including age, parity, body mass index, duration of infertility, type of infertility (primary/secondary), presence or absence of male factor, findings of HSG and LS, and the last status regarding pregnancy and having a child were extracted from patients' medical charts.

All patients underwent HSG on between cycle days 6 and 11. A water soluble contrast agent was used. Doxycycline 100 mg twice a day was given to all patients thirty minutes prior to HSG and subsequent 5 days. All HSG images were evaluated by the same infertility specialist team. LS then performed within 4 weeks after HSG procedure. During LS, tubal patency was assessed using 0.25% methylene blue dye injected through the cervix via a Novak cannula.

The study was approved by the Ethics Committee of the Health Science University, Suleymaniye Maternity Training and Research Hospital, Istanbul, Turkey. The manuscript was prepared in accordance with the STRENGTHENING THE REPORTING OF OBSERVATIONAL STUDIES IN EPIDEMIOLOGY (STROBE) guideline(6).

Statistical analyses were using SPSS version 16.0 (SPSS, Inc, Chicago, IL). Clinical variables, including the categorical data were analyzed using either chi-square or Fischer exact test. The sensitivity, specificity, PPV and NPV were calculated. A probability value of less than 0.05 was defined as statistically significant.

Results

Clinical characteristics of the study cohort were presented in Table 1. The mean age of the patients were 33.9 years. Among 67 patients, 40 had primary and 27 had secondary infertility. All of the patients younger than 25 years had primary infertility. Eight of 13 patients (61.5%) who are 25-29 year old, 11 of 18 patients (61.1%) aged 30-34 years, 10 of 18 patients (55.5%) aged 35-39 years and 5 of 12 patients (41.6%) who are 40 or more had primary infertility. Infertility type regarding patients' age did not reach statistical significance ($p=0.447$). Male factor was found in 9% of the patients. The infertility duration was 12 months or more in more than 95% of the patients.

Table 2 summarizes the diagnostic performance of HSG in comparison with LS. Among 46 patients who had bilateral tubal patency on HSG, 3 had unilateral and 1 had bilateral tubal occlusion on LS. Nine of 21 patients who had at least one tubal occlusion on HSG had bilateral tubal patency on LS.

Diagnostic accuracy of HSG in diagnosing tubal patency by comparing with LS were presented in Table 3. The sensitivity, specificity, PPV and NPV for bilateral tubal patency were 82.3%, 75%, 91.3% and 57.1%,

respectively. The sensitivity, specificity, PPV and NPV for nonpatency were 62.5%, 93.2%, 55.5% and 94.8%, respectively.

Within a median follow-up time of 19 months (range, 2-28 months), a total of 41 pregnancies were achieved. Twenty-one patients conceived spontaneously. Fourteen and 6 patients achieved pregnancy through intrauterine insemination and in vitro fertilization, respectively.

Table 1
Clinical Variables of The Patients.

	Mean±SD
	n (%)
Age (years)	33.9±4.1
Infertility	
Primary	40 (59.7)
Secondary	27 (41.3)
Male factor	
Yes	6 (8.9)
No	61 (91.1)
Duration of infertility (months)	
6-12	3 (4.4)
12-24	41 (61.1)
24-36	17 (25.3)
>36	6 (8.9)
Body mass index (kg/m²)	
<25	20 (29.8)
25-29	30 (44.7)
>29	17 (25.3)
Total	67 (100)

Table 2
Comparison of findings on tubal patency on HSG and LS.

Hysterosalpingography	L a p a r o s c o p y			
	Bilateral tubal	Unilateral	Nonpatency	Total
	patency	tubal patency	n (%)	n (%)
Bilateral tubal patency	42 (62.6)	3 (4.4)	1 (1.4)	46 (68.6)
Unilateral tubal patency	8 (11.9)	2 (2.9)	2 (2.9)	12 (17.9)
Nonpatency	1 (1.4)	3 (4.4)	5 (7.4)	9 (13.4)
Total	45 (67.1)	13 (19.4)	9 (13.4)	67 (100)

Table 3

Diagnostic Accuracy of HSG For Tubal Status.

	<i>n</i>	TP	TN	FP	FN	Sensitivit y, %	Specificit y, %	PPV, %, %	NPV , %
Bilateral tubal patency	67	42	12	4	9	82.3	75	91.3	57.1
Nonpatency	67	5	55	4	3	62.5	93.2	55.5	94.8

FN: False negative, FP: False positive, NPV: Negative predictive value, PPV: Positive predictive value, TN: True negative, TP: True positive.

Discussion

Coursing Even though LS is the most effective method of assessing the tubal patency, HSG, as a less invasive and more feasible modality, is used as first step. However, the diagnostic accuracy of HSG on tubal patency has still been investigated. In this study, we compared HSG findings with LS findings.

Our results show that the diagnosis of bilateral tubal patency on HSG is reliable. However, the sensitivity of HSG on nonpatency was only 62.5%. In contrast, a metaanalysis of 20 studies where HSG was compared to LS found that the sensitivity and specificity of HSG on tubal patency were found to be 65% and 83%, respectively(7). Subgroup analyses showed that HSG has higher sensitivity and specificity in cases with distal tubal occlusion and very less specificity in proximal tubal occlusion. Major difference between our study and this metaanalysis could be explained by temporary tubal spasm and wrong placement of uterine catheter. In addition, both water-soluble and oil based medias were used in their study. However, we used only water-soluble media for all patients.

In our study, the sensitivity and specificity of HSG for detecting bilateral tubal patency were 82% and 75%, respectively. For nonpatency, HSG has a sensitivity of 62%, and a specificity of 93%. A prospective study, including 62 infertile women found that HSG for nonpatency has a sensitivity of 92% and specificity of 86%(8). A metaanalysis reported 53% sensitivity and 87% specificity for HSG while detecting any tubal pathology. HSG for diagnosing bilateral nonpatency had a sensitivity of 49% and a specificity of 95%(9). Differences between results of various studies may be explained by the experience level of physicians in different studies. In addition, choice of contrast media (water-soluble vs oil based) may affect the results.

In the present study, we were not able to detect tubal patency by LS in 4 of 46 (2.1%) patients in whom bilateral tubal patency were detected on HSG. Similarly, a prospective, multicenter study found that 5% of those with a uni- or bilateral tubal patency on HSG had bilateral tubal occlusion on LS(10).

The major strength of our study is that all LS procedures were performed by the same team in the same fashion. HSG images were evaluated by the same team. In addition, the time interval between HSG and LS was limited with 4 weeks to prevent the development of any new tubal pathology. The main limitation is its retrospective design and the small number of included patients.

In conclusion, LS should be performed when HSG shows tubal pathology. In these cases, HSG and LS are complementary methods in evaluation of infertility. When HSG shows bilateral tubal patency, LS could be delayed or abandoned as the probability of finding a tubal occlusion on LS in these patients is very low.

Ethics Committee Approval: The study was approved by the Ethics Committee of the Health Science University, Suleymaniye Maternity Training and Research Hospital, Istanbul, Turkey.

Informed Consent: Written consent was obtained from the participants.

Conflict of Interest: Authors declared no conflict of interest.

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