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Is Laparoscopy Still Necessary in the Management of Tubal Infertility?

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Abstract

Objectives: To compare between hysterosalpingography (HSG) and laparoscopic findings in patients tested for infertility and thereby to determine the significance of the latter examination. **Methods:** This was a descriptive study performed in two Gynecology departments in the Dakar (Senegal). Included were 84 patients with suspicious tubal-infertility who underwent HSG followed by laparoscopy. The Kappa (K) statistics was used to clarify the concordance between HSG vs. laparoscopy findings. **Results:** Kappa concordance between HSG and laparoscopy showed the followings: 0.08 for proximal tubal obstructions (poor agreement), 0.40 for distal tubal obstructions (moderate agreement), and −0.08 for peritoneal adhesions (no agreement). Laparoscopy revealed pelvic adhesions in 84% of cases, pelvic endometriosis in 12% of cases, and apparently normal tubes in 12%. According to the distal tubal operability score, 16.6% of the lesions were classified as stage 4 and 23.8% at stage 1. **Conclusion:** HSG and laparoscopy findings did not agree in patients with tubal infertility, and thus, laparoscopy should be employed, especially when HSG showed abnormal findings. HSG has a low diagnostic value in adhesions.

Keywords

Hysterosalpingography, Laparoscopy, Infertility, Pelvic Adhesions

1. Introduction

Sterility, due to its high frequency, has become a medical problem with an important socio-economic consequence. Because of the high frequency of tubal pathology, it is necessary to have a good tubal evaluation tool. Hysterosalpingography (HSG) is the recommended first-line imaging test for initial tubal explo-

ration [1] [2]. However, in addition to an obvious diagnostic contribution, laparoscopy can correct certain anatomical abnormalities [3] which are responsible for tubal obstruction. The objectives of our study were to describe the epidemiological and clinical profile of the patients who benefited from these two examinations in our structure and to assess the concordance between hysterosalpingography and laparoscopy in the exploration of tubal abnormalities.

2. Methodology

Our study focused on two referral hospitals in the Dakar region in Senegal. This was a descriptive and analytical study of a continuous series of cases of diagnostic or operative gynecologic laparoscopy. We performed an exhaustive recruitment of all patients who underwent HSG and who had undergone laparoscopy during the study period for tubal infertility. For each patient, we compiled an individual survey sheet and studied the socio-demographic characteristics, HSG results, and laparoscopy data. To complete this form, we relied on patient files, possibly supplemented by telephone calls, and operating report forms. Data was entered and analyzed using Sphinx Millennium version 4.5 software. Correlation examination between variables during analysis was performed using goodness-of-fit and comparison tests, using SPSS (Statistical Package for Social Sciences) Version 17.0 software. The Kappa (K) statistic was used to clarify the concordance between HSG results and laparoscopy results.

3. Results

We performed 84 laparoscopic procedures for tubal infertility (**Table 1**). The average age of the patients was 34 years. The largest age group was between 35 and 39 years old (39.3%) with extremes of 23 and 43 years and a standard deviation of 5.19. Infertility was primary in 52.4% of cases and secondary in 47.6% of cases. The majority of our patients (45.2%) had infertility ranging from 4 to 7 years, with a minimum of 2 years and a maximum of 20 years. The average duration of infertility was 7 years. A history of sexually transmitted infection was found in 18 patients (21%). This was mainly a history of infections related to *Chlamydiae trachomatis*.

When laparoscopy was performed, 70 patients presented with pelvic adhesions (83%), and 10 cases of perihepatic adhesions, *i.e.* 12%. Hydrosalpinx was found in 30% of cases and phimosis in 35% of cases. Tubal obstructions were present in 40% of cases distributed as follows: proximal obstructions 21% and distal obstruction 19%. The proximal tubal obstructions were bilateral in 6 cases and unilateral in 12 cases. Distal obstructions were bilateral in 10 cases and unilateral in 6 cases. We found 12% of endometriotic nodules, *i.e.* 10 cases including 4 endometriomas. In 12% of the patients the tubes were normal whereas the hysterosalpingography found pathology. The exploration also allowed us to classify the anatomical lesions of the patients by referring to the distal tubal operability score. Thus, stage 1 was found in 24% and stage 4 in 17% of cases.

The comparison between HSG and laparoscopy (Table 2) showed moderate agreement regarding the diagnosis of distal tubal obstructions (K = 0.4). Agreement was low, however, in the case of proximal tubal obstruction (K = 0.08). The concordance between HSG and laparoscopy in hydrosalpinx was better (K = 0.58), although moderate. The sensitivity of HSG in the diagnosis of hydrosalpinx was 76%, and its specificity was 75%. The concordance between HSG and laparoscopy was also moderate in relation to phimosis (K = 0.44). The sensitivity of HSG in detecting adhesions was 4% while its specificity was 92%. There was no concordance between HSG and laparoscopy regarding adhesions (K less than 0).

Table 1. Characteristics of the patients.

	Absolute frequency (%)
Type of infertility	
Primary	44 (52.4%)
Secondary	40 (47.6%)
Average duration of infertility (years)	7 years (2 - 20)
History of abdomino-pelvic surgery	
Myomectomy	2 (2.3%)
Tubal plasty	1 (1.2%)
Ovarian cystectomy	4 (4.7%)
Salpingectomy	2 (2.3%)
Caesarean section	20 (23.8%)
2D ultrasound results	
Normal	70 (83.3%)
Uterine fibroma	7 (8.3%)
Ovarian cyst	3 (3.5%)
Endocavity polyp	1 (1.2%)
Endometriosis	1 (1.2%)

Table 2. Concordances between hysterosalpingography and laparoscopy in the diagnosis of tubo-peritoneal anatomical lesions.

	HSG N = 84	Cœlioscopie N = 84	K	Concordance
Adhesions	2 (2.3%)	70 (83%)	−0.008	Verylow
Phimosis	10 (12%)	29 (35%)	0.36	Low
Hydrosalpinx	34 (40.5%)	26 (30%)	0.44	Moderate
Proximal obstruction	40 (47.6%)	18 (21%)	0.08	Verylow
Distal obstruction	28 (33%)	16 (19%)	0.4	Moderate
Fitz-Hugh-Curtis syndrome	-	10 (12%)		
Endometriosis	-	10 (12%)		
Fibroids	-	5 (6%)		
Sactosalpinx	2 (2.3%)	1 (1%)		

4. Discussion

4.1. Profile of Female Infertility

It should be noted that the prevalence of infertility is higher in Africa than in the countries of the North. The infertility rate in sub-Saharan Africa is even one of the highest in the world, and 15% to 30% of couples are affected by this problem compared to 5% to 10% of couples in developed countries [4] [5]. Epidemiological studies carried out in Senegal estimated the couple's infertility in Senegal between 12% and 14%, in young women (average age 32 years) with a tubo-peritoneal cause which was found in 21% to 61% [6] [7] [8]. Thus, we can understand that with this etiological profile of female infertility, ultrasound and HSG are the first-line examinations to search for pelvic anatomical pathology. All of our patients had undergone HSG for this purpose. In developing countries like Senegal, mechanical causes by tubal obstruction are thought to play a determining role in the onset of infertility. These causes are certainly linked to the high prevalence of infections for which the management would not be adequate.

4.2. Concordance in Proximal Tubal Obstructions

In our series, 43% of the tubes blocked at HSG were permeable at laparoscopy. In the series by Mol *et al.* [9], the same observation was found in 40% of proximal obstructions. A study carried out in France [10] showed in HSG, a rate of tubal spasm of 40% which was revealed to be permeable to laparoscopy. The existence of a tubal spasm proximal to HSG therefore justifies performing a laparoscopy in order to rule out or confirm the diagnosis. The presence of false positives for HSG can be explained by spasms in response to pain and mucous plugging. Certain measures before performing HSG make it possible to reduce the rate of false positives, such as the use of analgesics, psychological preparation, traction of the uterine cervix in order to reduce possible anteversion or retroversion and above all a good interpretation of the pictures [3]. The latter presents a significant inter-operator variability, estimated at more than 20% [11]. It should be recognized that good reliability of HSG in the diagnosis of proximal tubal obstructions would render laparoscopy unnecessary and would justify a switch to in vitro fertilization [3] [12]. Regarding tubes permeable to HSG and obstructed by laparoscopy, some authors recommended a deep anesthesia before reinjecting the bruise. This device allowed them to objectify a tubal passage 3 times out of 4 [3]. Tshabu [13] in Benin uses this device to relieve the tubal spasm. Another explanation for the tubal obstruction found on laparoscopy would be the long time that elapses between performing HSG and laparoscopy, which may explain the appearance of tubal pathology at laparoscopy although it is absent at HSG.

4.3. Concordance in Distal Tubal Obstructions

Distal tubal obstructions are accessible to therapeutic surgical procedures [14]. This diagnosis justifies the practice of a laparoscopy for therapeutic purposes. In our study, the 2 examinations were in agreement concerning the distal tubal pa-

tency in 62% of cases with a Kappa test at 0.40 indicating a moderate correlation. These rates are found by Tsabu [13] (67%) and Kehila [3] in 83.3% with a k = 0.53. In fact, the difficulty in this case is above all to differentiate bilateral tubal patency from unilateral distal obstruction at HSG. Because the vision of the tube injected up to its distal part associated with the peritoneal mixing from the permeable tube can easily be confused with bilateral patency [3].

4.4. Concordance in Adhesions

The relationship between pelvic adhesions and female infertility is recognized. These adhesions alter the delicate anatomical relationship between the tubal bulb and the ovary, interfering with or preventing normal capture of the oocyte [15]. Its prevalence in infertility is estimated between 10% and 23% [9]. The reliability of HSG in peritoneal assessment is far from absolute. Most of the studies argue in favor of the clear superiority of laparoscopy in this indication. We believe that, providing a direct view of the pelvis, laparoscopy can be considered the gold standard for detecting pelvic adhesions.

The sensitivity of HSG in detecting pelvic-peritoneal adhesions was very low (4%) with a K = −0.008. This rate is lower than that found by Kehila [3] 9.5%. In Dadoun's study [10], 80% of patients had adhesions found on laparoscopy. Ngowa [16] found sensitivity (24.6%) of HSG in the diagnosis of adhesions. In summary, for the assessment of adhesions, the HSG was unreliable [17] [18].

4.5. Implications for Practice and Research

Given the high frequency of tuboperitoneal lesions in Africa, early management of sexually transmitted infections could certainly prevent tubal infertility.

Laparoscopy should be recommended when hysterosalpingography finds a unilateral or bilateral tubal abnormality.

Since hysterosalpingography is unreliable, laparoscopy should be recommended in cases of unexplained tubal infertility (with apparently normal hysterosalpingography).

4.6. Strengths and Limitations of This Study

The weaknesses of this study are:

- Interpretations of hysterosalpingography with the risks associated with inter-observer variations;
- The relatively small sample size;
- Some patients were not collected because they had hysterosalpingography, but due to lack of financial means, they were not able to benefit from a laparoscopy.

The strengths of this study are:

- Systematic performance of hysterosalpingography and laparoscopy for all patients collected;
- The multicenter nature of the study.

5. Conclusion

Laparoscopy remains the examination of choice in the etiological diagnosis of tuboperitoneal infertility. HSG performs poorly in proximal tubal obstructions, adhesions, endometriosis, and Fitz Hugh Kurtis syndrome. However, it should be performed first, as when normal it limits the indications for laparoscopy to unexplained infertility.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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