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Hysterosalpingographic Findings among Patients Undergoing Infertility Work-Up in Kisangani, Democratic Republic of the Congo

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Abstract

Introduction: Hysterosalpingography is an important tool in the investigation of the causes of female infertility. In developing countries such as the Democratic Republic of Congo, the HSG is the basic tool for performing first-line anatomical (pelvic) assessment. The aim of this study is to determine the prevalence of the different lesions observed in hysterosalpingography carried out during the assessment of infertile women monitored in Kisangani. The study set also out to look for differences in these lesions according to the type of infertility. **Methods:** This cross-sectional study was conducted in Kisangani from June 2016 to December 2018. The 130 cases of hysterosalpingography performed for female infertility assessment during the study period were included, of which 33.07% for primary infertility and 66.93% for secondary infertility. **Results:** The mean age of the patients was 33.52 ± 6.01 years; the history of pelvic inflammatory disease was noted with a predominance for secondary infertility (11% vs. 4.65%). Using hysterosalpingography, 7 (5.38%) patients had a normal result; 94 (72.31%) had tubal obstruction; 25 (19.23%) had hydrosalpinx; 11 (8.46%) had uterine fibroids; pelvic adhesions were suspected in 12.64% of cases. There was no obvious association between all these lesions and the type of infertility. **Conclusion:** We found that tubal obstructions were the most prevalent lesions in this study, regardless of the type of infertility. These lesions would reflect the high prevalence of septic abortions and sexually transmitted infections in developing countries such as the Democratic Republic of the Congo.

Keywords

Hysterosalpingography, Female Infertility, Tubal Obstruction, Hydrosalpinx, Pelvic Adhesion, Uterine Fibroids

1. Introduction

It is estimated that infertility affects about 48.5million couples, of which only 35% seek medical assistance [1]. Infertility is a matter for concerne in Africa given the stigmatisation attached to it and instablility in couples without a child which represents 7% - 21% depending on the region [2]. Although infertility affects men, women, and both; female infertility is the one of the greatest challenges in contemporary gynecological practice [3]. Yet WHO reports that female infertility accounts for only 30% of cases in sub-Saharan Africa [4].

Among the causes of female infertility, tuboperitoneal factors play a predominant role, responsible for 42% to 77% of cases in Africa [5]. The tuboperitoneal factors have also been identified in western countries [6]. Indeed, the search for tuboperitoneal factors is an important step in the investigation of female infertility. It uses hysterosalpingography (HSG), hysterosalpingo-contrast-sonography (HyCoSy) and laparoscopy, generally considered the "gold standard" [7]. However, being an invasive and costly test, laparoscopy should be reserved for patients who may also benefit from the management of another pre-existing pelvic pathology [8]. In Sub-Sahara Africa, since laparoscopy is not readily available and expensive, the HSG is widely accepted as a basic tool for adequate first-line anatomical evaluation [5].

The sensitivity and specificity of the HSG are globally estimated at respectively 65% - 81.41% and 47.8% - 50% in the detection of tubal pathologies [9]; 92.1% and 85.7% for patency or tubal obstruction [10] and 35.5 and 81.3% for peritubular adhesions [11]. In addition, it has a concordance that varies between 38% [12] and 75% [13] with laparoscopy for the diagnosis of tubal obstructions. The HSG is therefore a crucial examination which, in addition to the tubal balance, allows to explore the uterine cavity.

Several studies have presented the results of the HSG in the literature. In the study conducted by Ohene *et al.* [14] in Ghana, the main findings of the HSG were uterine fibroids (25.4%), bilateral tubal obstruction (20.5%), left tubal obstruction (12.5%) and right tubal obstruction (10.6%). In a South African study, tuboperitoneal factors were noted in 81.8% of cases, with peritubary adhesions in 5% and tubal obstructions in 27.4% of cases [15]. In Turkey, 21% of infertile women had unilateral tubal obstruction to the HSG and 12% had bilateral obstruction. Adnexal adhesions were suspected in 12% of cases [16].

To our knowledge, the HSG and the HyCoSy are the two means that allow, besides laparotomy, the exploration of the Fallopian tube and the uterine cavity in Kisangani. Since the digitization of the X-Ray department of Kisangani Uni-

versity Hospital, we have witnessed a significant improvement in the quality of the images and a large attendance of the service for multiple indications. These include primary or secondary infertility, abortion, metrorrhagia and postoperative tubal balance of a myomectomy or tubal ligation. However, the main results recorded have never been documented. The purpose of this study is to determine the prevalence of the different lesions recorded at the HSG during the assessment of infertile women treated in Kisangani, in the North-East of the Democratic Republic of Congo (DRC). The study set also out to assess whether they present statistical differences between patients with primary infertility and those with secondary infertility.

2. Patients and Methods

This cross-sectional study was conducted in Kisangani, DRC, between June 2016 and December 2018. It focused on infertile patients treated at Kisangani University Hospital (KUH) and the Kisangani Angels Clinic (KAC) who had undergone an infertility assessment including HSG and who had given their oral consent to participate in the study. These two medical units were chosen because they support the vast majority of infertile couples in the City.

In this study, data collection was prospective. At admission, all patients were interviewed to get information regarding age, age of first sexual intercourse (coitarche), infertility duration, gynecological history, obstetrical history; and history of pelvic surgery including fibroidectomy, ovarian cystectomy, appendectomy, salpingectomy/salpingostomy, adhesiolysis and caesarean section. After physical examination, they had undergone an infectious investigation including inflammatory assessment, vaginal bacteriological sampling, anti-Chlamydia trachomatis serology, TPHA, VDRL and HIV serology, as well as the hormonal assessment. The HSG was scheduled between the 7th and 12th day of the menstrual cycle, and performed in the digitized room of X-ray department of the KUH. To rule out the possibility of early pregnancy, we performed a systematic plasma beta-human chorionic gonadotrophin (b-hCG) prior to any HSG procedure, although the HSG was performed during the first phase of the menstrual cycle. Pregnancy, active genital infection, the history of recent uterine surgery, genital bleeding and known allergy to iodinated contrast were considered as contraindications to the HSG. Patients with history of ectopic pregnancy or tubal surgery, those who refused to perform the HSG and patients who did not consent to the study were excluded. Finally, a total of 130 patients were included and 12 were excluded.

According to our protocol, the HSG was not performed under intravenous sedation. We are properly do an oral nonsteroidal anti-inflammatory drug (Diclofenac 50 mg) 30 to 45 minutes earlier to relieve pain or discomfort during and after the test, an antispasmodic (40 mg Papaverine or 10 mg of Hyocine) one hour before the test to prevent tubal spasm, and antibiotic prophylaxis made of Doxycycline (100 to 200 mg daily for 5 days), to start 48 hours before the test. In case of allergy to Doxycycline, we give Azythromycin for 4 days (1 g on the first

day then 500 mg per day), starting the day before the test.

The HSG was performed by an experienced Radiologist, assisted by a Gynecologist, using the usual metal cannula system and using a Pozzi pliers. When the cannula was in place, a water-soluble iodinated contrast medium (TELEBRIX-HYSTERO 250 mg I/ml, GUERBET, France) was gently administered. A minimum of 5 X-rays were systematically taken, including a pelvis shot without preparation and 4 facial images (beginning of filling, face repletion, early evacuation, late peritoneal shaking) during the administration of the radiopaque product. In addition to the 5, other frontal images were taken as a function of the discharge of contrast media into the pelvic cavity, and the profile images were made only if necessary. All snapshots were read and documented by two qualified and experienced Radiologists, and the final result was obtained by consensus.

We used Epi Info™ 7.2.2.6 software to analyze the data. The frequency, the percentage, the averages and their standard deviations allowed us to describe the sample. Pearson's chi-square or Exact Fisher at the $p < 0.05$ significance level was used to test the association between the HSG results and the type of infertility.

Before conducting the study, the special authorizations of the KUH and KAC authorities were obtained and the protocol was approved by the Ethics Committee of the University of Kisangani. The information was collected, processed and analyzed with the strictest anonymity.

3. Results

During the study period, 130 HSGs were performed including 43 (33.07%) for primary infertility and 87 (66.93%) for secondary infertility. The age of the patients ranged from 21 to 49 years with an average of 33.52 ± 6.01 years (32.41 years ± 6.78 for primary infertility and 34.06 years ± 5.56 for secondary infertility). The history of pelvic inflammatory disease (PID) was noted in 9 patients, with a predominance for secondary infertility (11% vs. 4.65%). The demographic characteristics and history of these patients are presented in Table 1, depending on the type of infertility.

Table 1. Demographic characteristics and patient histories based on the type of infertility.

Paramètre	Frequency (n = 130)	Primary infertility (n = 43)	Secondary infertility (n = 87)
Age*	-	32.41 ± 6.78	34.06 ± 5.56
Gesture*	-	0 (0%)	2.80 ± 2.34
Parity*	-	0 (0%)	1.18 ± 1.53
History of PID	9 (6.92%)	2 (4.65%)	10 (11%)
History of abortion	71 (54.61%)	0 (0%)	71 (81.61%)
History of fibroidectomy	29 (22.30%)	12 (27.91%)	17 (19.54%)
History of ovarian cystectomy	56 (43.07%)	15 (34.88%)	41 (47.13%)
History of appendectomy	67 (51.53%)	19 (44.19%)	48 (55.17%)

*Mean ± Standard Deviation.

The results of the HSG are shown in Table 2. Of 130 cases of the HSG, 123 (94.62%) were pathological and 7 (5.38%) non-pathological. The pathologies observed were dominated by tubal obstruction (72.31%), suspicion of peritubary adhesions (10.77%), uterine fibroids (8.46%), uterine malformations (6.15%) and retroverted uterus (4.62%).

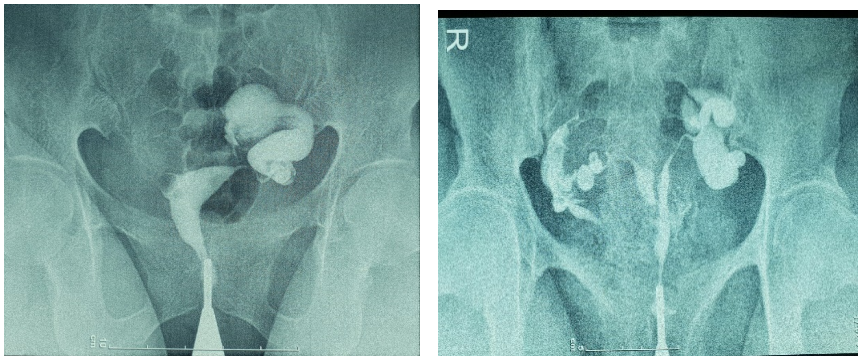
Tubal obstructions were diagnosed in 72.31% of cases (94/130) including bilateral obstructions in 30% and unilateral obstructions in 42.3% of cases. These obstructions were associated with the left hydrosalpinx (Figure 1(a) and Figure 1(b)) in 9.23% and right in 6.15% of cases. These tubal lesions appeared to be more frequent in patients with secondary infertility, but the difference was not significant (p = 0.35 for obstructions, p = 0.24 for hydrosalpinx).

Uterine anomalies were observed in 25.38% of cases, mainly made of uterine fibroids, uterine malformations, retroverted uterus, uterine synechiae (Figure 1(b)) and uterine dextroversion (Figure 2(a)). Uterine malformations included one case of unicorn uterus, five cases of uterine hypoplasia and two cases of arched uterus (Figure 2(b)). No obvious associations were observed between these uterine anomalies and the type of infertility (p = 0.19).

Table 2. Pathologies observed at the hysterosalpingography.

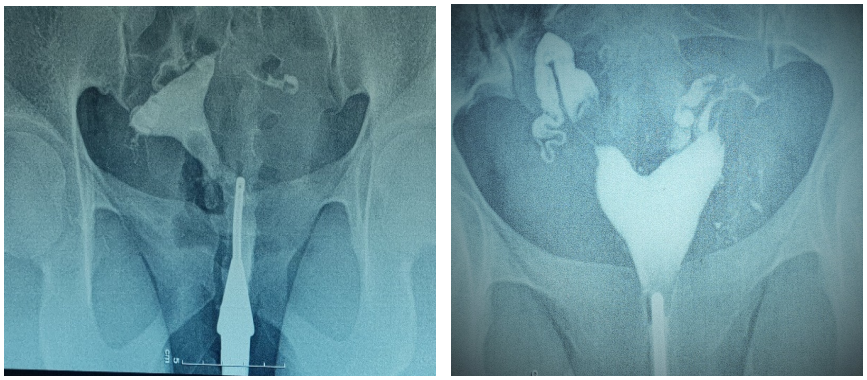
HSG results	Frequency (n = 130)	Primary infertility (n = 43)	Secondary infertility (n = 87)	p-value
Bilateral tubal obstruction	39 (30%)	15 (23.25%)	24 (27.58%)	
Right tubal obstruction	30 (23.07%)	10 (23.25%)	20 (22.98%)	0.35
Left tubal obstruction	25 (19.23%)	7 (16.27%)	18 (20.68%)	
Bilateral hydrosalpinx	5 (3.85%)	2 (4.65%)	3 (3.45%)	
Right hydrosalpinx	8 (6.15%)	1 (2.33%)	6 (6.89%)	0.24
Left hydrosalpinx	12 (9.23%)	3 (6.98%)	9 (10.34%)	
Uterine anomalies	33 (25.38%)	13 (30.23%)	20 (22.99%)	0.19
- *Uterine fibroids*	11 (8.46%)	5 (11.63%)	6 (6.90%)	
- *Uterine malformations**	8 (6.15%)	6 (13.95%)	2 (2.30%)	
- *Retroverted uterus*	6 (4.62%)	1 (2.33%)	5 (5.75%)	
- *Uterine synechiae*	4 (3.08%)	0	4 (4.60%)	
- incompetent cervico isthmus	2 (1.54%)	0	2 (2.30%)	
- *Uterine dextroversion*	2 (1.54%)	1 (2.33%)	1 (1.15%)	
Peritubal adhesions	14 (10.77%)	3 (6.98%)	11 (12.64%)	0.25

Uterine malformations: 1 case of monocorn uterus, 5 cases of uterine hypoplasia and 2 cases of arched uterus.



(a) (b)

Figure 1. (a) Right proximal tubal obstruction and left hydrosalpinx in a 34-year-old nulligest with an 11-year desire for maternity; (b) Uterine synechia, left hydrosalpinx, and right tubal phimosis in a 42-year-old patient, $P_1G_3A_2$, with a history of STI (sexually transmitted infection) and a 12-year desire for maternity. Also to note the left tubal rigidity.



(a) (b)

Figure 2. (a) Uterine dextroversion fixed in a 28-year-old patient, nulligest with 7-year desire for maternity; (b) Depression of the uterine fundus compatible with an arched uterus; Right distal tubal obstruction and dilatation, left tubal phimosis in a 31-year-old patient, $P_2G_{16}A_{14}$, with a 5-year desire for maternity.

4. Discussion

The HSG is a fairly common test in most imaging services in sub-Saharan Africa, reflecting the importance of this test in the management of gynecological pathology. It is mainly performed in women during periods of genital activity with a frequency peak at around 33 years, as confirmed by most studies [5] [14] [17]. In our study, the average age of sampled women was 32.41 years for primary infertility and 34.06 years for secondary infertility.

The HSG is mainly performed in a context of primary and secondary infertility [17]. While primary infertility prevails in some parts of the world, as in Iran and Turkey [16] [18], African literature describes secondary infertility as its most common form [5] [14] [19]. This was noted in our study where 87 (66.92%) patients had secondary infertility. This high prevalence of secondary infertility in Africa is believed to be related to PID specific to sexually transmit-

ted infections (STIs), post abortum infections and puerperal infections [14]. We recorded the antecedent of PID in 11.49% of cases in patients with secondary infertility compared to 4.62% of cases for primary infertility. Similarly, 71 patients with secondary infertility had the antecedent of abortion. These women with secondary infertility would have a high probability of having structural lesions of the Fallopian tube, compared with those with primary infertility [20]. This is why the exploration of the Fallopian tube and thus the HSG keeps a prominent place in the balance sheet of female infertility.

In our study, 94.62% of the HSG were pathological and 5.38% were non-pathological. These results are different from those of Bukar *et al.* in Nigeria [21] and Ohene *et al.* in Ghana [14] who found 70.6% and 60.3% of the HSG's pathological findings, respectively in 2011 and 2015. Guena *et al.* [17] performed 120 HSG in Cameroon, of which 89.17% were pathological. Conversely, Adrian *et al.* [22] recorded 55% of normal HSG results in Switzerland. The analysis of these different studies proves that the pathological results of the HSG prevail in countries with limited resources. The pathologies diagnosed in our series consisted mainly of tubal obstructions (72.31%). These obstructions were associated with hydrosalpinx in 19.23%. We also observed uterine anomalies in 25.38% and peritual adherent lesions in 10.77% of cases. These lesions observed in our study correspond to the range of anomalies recorded by many other authors but to different degrees. In a series of 1140 HSGs carried out in Ghana for infertility assessment, Ohene [14] had identified tubal obstructions in 43.6% of cases and uterine anomalies in 34.5% of cases. In Cameroon, tubal lesions were noted in 45.82%, uterine anomalies in 33.34% and suspicion of adhesions in 5.84% of cases [17]. Kouamé [23] found in a series of 124 HSGs performed in Ivory Coast 50.3% of uterine diseases, 25.2% of tubal pathologies and 7% of peritoneal abnormalities.

We have found that the prevalence of tubal obstructions recorded in our study is higher than all other African series. These tubal obstructions were much more unilateral than bilateral giving the patient a chance to conceive with the permeable Fallopian tube. This result would reflect the high prevalence of STIs in the DRC, a low-income and post-armed conflict country. It should be noted that some tubal obstructions may be due to tubal spasm during injection of the contrast medium. In our study, we administered antispasmodics to all patients before performing the HSG, as recommended [13]. In addition to spasm, administration of the opaque radio product can also dislodge the mucous plug or break the intra tubal and fine peritoneal adhesions, giving images of tubal permeability while the tube was initially obstructed. These different tubal obstructions observed in our study did not show a statistical association with the type of infertility ($p = 0.33$). On the other hand, Taimoora *et al.* [24] reported in Oman a highly significant statistical association between unilateral tubal obstruction and type of infertility, favoring secondary infertility ($p < 0.0001$).

Of uterine anomalies observed in this study, uterine fibroids accounted for 8.46% of cases. This result is lower than other studies in sub-Saharan Africa [14] [17]. However, in case of uterine fibroids, infertility can result from the effects of

submucosal fibromyoma, the alteration of uterine contractility, which could harm the interactions between sperm and egg or embryo migration, which is seen in uteri with multiple large fibroids and significant distortion of the uterine cavity [25].

Congenital malformations of the uterus were observed in 6.15% of the HSG cases with arched uteri in 1.54% of cases. Our prevalence of congenital malformations of the uterus correlates with that of Pakistan, where congenital malformations of the uterus were observed in 6% of cases of the HSG [26]. However, the prevalence of the arched uterus is about 8 times higher than that recorded in Ghana [14] but correlates with 1.6% reported in Uganda [27]. Retroverted uterus was diagnosed in 4.62% of the HSG cases. In a series of 807 infertile women followed by Egbase *et al.* [28] 38.2% had a retroverted uterus and low implantation rate and clinical pregnancy, compared to infertile patients with anteverted uterus. In Ghana, the prevalence of the retroverted uterus is 0.4% [14].

Uterine synechiae, an abnormality characterized by a fibrous union of two sides of the uterine interior, is manifested at the HSG by persistent lacunary images despite the pressure of injection of contrast medium. We diagnosed it in 3.08% of cases. This is less than 5.84% described in Cameroon [17], but the lowest rate is reported in Ghana [14]. More than half (54.61%) of our respondents had abortion history. These abortions, often provoked with the uterine curettage and performed under septic conditions, can explain the percentage of synechiae diagnosed in our series.

5. Conclusion

The HSG remains an indispensable test for investigating female infertility in resource-poor countries such as the DRC. In our study, the results of the HSG were pathological in 94.62% of cases tested, consisting mainly of tubal obstructions (72.31%). These were much more unilateral than bilateral, and localized more to the right than to the left, and had nothing to do with a type of infertility. Tubal obstructions would reflect the high prevalence of STIs and postabortum infections as evidenced by the history of PID and abortion registered with our patients. The primary prevention of genital tract infections and the improvement of abortion practice conditions would be crucial to reduce the incidence of tubal infertility in our country.

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Conflicts of Interest

The authors declare that they have no conflict of interest in the writing of this article.

Contribution of the Authors

BNJD: study design, data collection, statistical analysis and data interpretation, literature review, preparation and validation of the final manuscript.

MOA: data collection, statistical analysis, substantive review, validation of the final version.

JSKV: harvest and interpretation of data, substantive review, validation of the final version.

LLG: data collection, literature review, validation of the final version.

MAA: interpretation of the data, substantive review, validation of the final version.

AKR: substantive review and validation of the final version.

KBG: design of the study, interpretation of the data, substantive review, validation of the final version, direction of the research.

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