

A Spectrum of Hysterosalpingographic Findings in Infertile Women in Benin City, Nigeria

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Abstract: *Background:* Infertility is a major clinico-social issue in Nigeria. Hysterosalpingography (HSG) is commonly used in the investigation of causes of female infertility. *Objective:* To evaluate the HSG technique and radiographic findings among infertile women examined in a tertiary health institution in Benin, Nigeria. *Subjects and Methods:* The study was a prospective survey. Both ethical approval and consents of women recruited for the study were obtained before the study commenced. A convenience sample of 238 women was recruited for the study. *Data collection:* Literature was reviewed to determine if HSG was performed in accordance with current imaging best practices in the center studied. Furthermore, radiologist's reports of all HSG examinations performed in the center within the study period were reviewed to determine HSG detected common causes of female infertility in Benin, Nigeria. *Data analysis:* Descriptive statistics were used to analyze data. Statistical analysis was performed with the SPSS computer software, version 17.0. Results were presented in tables and bar charts. Results revealed that investigation of causes of female infertility were still being performed using the traditional fluoroscopic HSG technique with static x-ray machine in the center during the period studied. Whereas 37.0% of women referred for HSG were in the 34-39 years age range, 70.0% percent of them were investigated for secondary infertility. Twenty-five (25.0%) percent of women studied had normal HSG examinations, 27.0% had tubal occlusion while 17% had uterine fibroids. *Conclusions;* in spite of HSG technique in the center studied not being performed in accordance with current imaging best practices, the modality still plays a significant role in the investigation of female infertility. Furthermore, tubal occlusion and leiomyoma were the most common HSG detected uterine lesions among the population of infertile women studied.

Key words: Female Infertility • Hysterosalpingography • Imaging Best Practice • Pathology • Nigeria

INTRODUCTION

The definition of infertility varies considerably. It is however, often defined as the inability of a couple to achieve pregnancy within a period not less than a year of adequate unprotected coitus [1]. It is a major clinico-social

issue in sub-Saharan Africa and in other parts of the world [2,3]. It is estimated that between 10-20% of women of reproductive age in sub-Saharan Africa has infertility problem [4]. In Nigeria, female infertility is regarded as a calamity and is often the cause of either divorce or polygamy [5]. Imaging plays a vital role in the workup for

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infertility and clinicians often rely on patient's history and physical examination to select an imaging procedure that is appropriate for each patient [4]. Depending on clinical assessment, imaging tests often requested in the workup for an infertile woman may include ultrasonography (US), hysterosalpingography (HSG), Sono hysterosalpingography (also known as Sono-HSG or saline infusion sonography [SIS]), Hysterosalpingo-contrast sonography (HyCoSy) and laparoscopy with chromopertubation (also called Lap and Dye test) [1].

Ultrasound is often the first line imaging investigation but HSG is more commonly requested in the investigation of female infertility if tubal involvement is suspected. HSG, according to American Society for Reproductive Medicine (ASRM), is the first line test for evaluation of tubal patency [5]. It is the x-ray investigation of the cervix, uterus and fallopian tubes following retrograde injection of water or lipid soluble contrast medium. It is known to be effective in the detection of mechanical causes of female infertility and is also thought to have some therapeutic potential [5-7]. Furthermore, HSG is relatively less expensive and easily available in developing countries. HSG is known to have 65% sensitivity and specificity in the diagnosis of tubal occlusion whereas lap and dye test has 83% sensitivity and specificity [8].

HSG is the main imaging investigation of female infertility in the center being studied. In the center, a fluoroscopy unit with an under couch x-ray tube is used for the investigation. The patient lies supine on the x-ray couch; her pubic area is cleaned with an antiseptic solution after which she lies in the lithotomy position with legs supported on stirrups. After necessary instrumentation which includes insertion of a Leech-Wilkinson cannula, the radiologist commences fluoroscopic screening. Then, intravaginal injection of water soluble, non-ionic, low osmolar contrast medium into the uterine cavity is commenced [9]. The movement of contrast is followed by the radiologist who requests x-ray films to be taken when necessary. A post injection film is taken with the over couch x-ray tube 30 minutes after screening to ascertain the level of reabsorption of contrast from uterine cavity and fallopian tubes into the peritoneum. Usually, between 3 and 4 films are taken during HSG in our center.

HSG in its traditional form is, however, of very limited use in detecting peritubal adhesions, endometriosis and even less useful where adhesions due to previous surgery are present [10]. It is also invasive and may be very uncomfortable in some patients necessitating the use of an anti-spasmodic drug or smooth muscle relaxant in very apprehensive patients. In extremely rare instances, sedation and or general anesthesia may be required if cervical cannulation is difficult [11]. These demerits have resulted in a paradigm shift from HSG in its traditional form as the primary imaging investigation of female infertility in developed and even in some developing countries of the world. Two variants of HSG now most commonly preferred employ real-time ultrasonography. These are saline infusion sonography (SIS) or Sono-hysterosalpingography (Sono-HSG) and Hysterosalpingo contrast sonography (HyCoSy).

Before either Sono-HSG or HyCoSy is commenced, a baseline transvaginal ultrasound examination is performed. Sono-HSG involves injection of a small quantity of sterile saline into the uterine cavity using a syringe. The saline fills the uterine cavity and then fills both fallopian tubes (if they are patent) and transvaginal ultrasound is subsequently commenced [10,12]. The superior picture clarity of the procedure is required when plain HSG and routine ultrasound do not provide sufficient clue to pelvic pathology. HyCoSy, on the other hand, involves transcervical injection of echogenic contrast media into the uterine cavity instead of saline. After injection, ultrasound is used to view the uterus, tubes and adnexae. HyCoSy is described as simple, time-efficient and effective method for evaluation of tubal patency, the uterine cavity and the myometrium [13,14].

Laparoscopy and hydrotubation (Lap and Dye test) is also another modality that has gained ground in developed countries [15]. Although Lap and Dye test is not routinely performed in the x-ray department, the procedure involves instillation of dye through the cervix with a cannula during laparoscopy in order to visualize tubal patency. Lap and dye test is indicated if previous pelvic infection, endometriosis or surgery is suspected [15].

Current imaging investigation of female infertility appears to be laying less emphasis on plain x-ray HSG in its traditional form as the first line of investigation globally. Even in developing countries like Nigeria,

sonography is easily available and does not involve exposure to ionizing radiation. Sono-HSG and HyCoSy are said to have superior diagnostic efficacy over the traditional HSG in the detection of peritubal adhesions and are easy to perform as part of daily routine in the x-ray department [4]. This then calls to question the rationale behind the continued reliance on the traditional form of HSG in the investigation of female infertility in our center. This study was, therefore, carried out to compare HSG technique in a tertiary hospital in Benin City, Nigeria, with current imaging best practices involved in the procedure. It was also our intention to determine common HSG detected uterine lesions among infertile women who came for investigation of the cause of their infertility in the center.

MATERIALS AND METHODS

This prospective survey was carried out between June, 2011 and May, 2012. Ethical approval for the study was obtained from the local committee on ethics in research. Informed consents of women recruited for the study were also obtained before the study began. A convenience sample of 238 women who were referred to the x-ray facility of the tertiary hospital was recruited.

Inclusion Criteria: Only women sure of the date of onset of their last menstrual period (LMP) and those not sure but had a negative laboratory blood test result for pregnancy in line with our department's protocol were included in the study.

Data Collection: Only those women who met the inclusion criteria were booked based on the 10- day rule [11]. Literature on current global best practice on radiologic investigation of female infertility was reviewed. A copy of the radiologists' report on each HSG performed was obtained after each reporting session. After this, the reports were sorted into causes of infertility (in the study, this refers to any lesion described by radiologists as detected in HSG) among infertile women in Benin metropolis, Nigeria.

Data Analysis: Only descriptive statistics were used to analyze data in line with specific objectives of the study. SPSS computer software, version 17.0 was used for all computations.

RESULTS

HSGs were performed in the center during the period studied only in its traditional form. Among 238 HSG results evaluated, 13 (5.4%) were inconclusive hence only 225 (94.6%) cases were evaluated. Table 1 shows that 84 (37.0%) and 20 (9.0%) of infertile women who came for HSG were in the 34-39 years and 22-27 years age range respectively. Fifteen percent (15%) of the women were investigated for causes of primary infertility whereas 70.0% were investigated for secondary infertility (Table 2).

Fifty-six (25.0%) women had normal HSGs whereas 31 (14.0%) had bilateral tubal occlusions (Table 3 and figure 1). Furthermore, right and left tubal occlusions (6.0% and 7.0% respectively), uterine fibroids (17.0%) and pelvic adhesion (12.0%) were also diagnosed.

Table 1: Age range of subjects

Age Range (year)	n
22 – 27 years	20 (9%)
28 – 33 years	44 (20%)
34 – 39 years	84 (37%)
40 – 45 years	61 (27%)
46 – 51 years	6 (3%)
Others	10 (4%)
n= 225 (100%)	

Table 2: Clinical indications for HSG

Primary infertility	34 (15%)
Secondary infertility	158 (70%)
Asherman's syndrome	6 (3%)
Uterine Fibroids	24 (11%)
Recurrent miscarriage	3 (1%)
n= 225 (100%)	

Table 3: HSG Findings

Bilateral tubal occlusion	31 (14%)
Right tubal occlusion	13 (6%)
Left tubal occlusion	15 (7%)
Bilateral hydrosalpinx	14 (6%)
Right unilateral hydrosalpinx	4 (2%)
Left unilateral hydrosalpinx	10 (4%)
Uterine fibroids	39 (17%)
Uterine synechia	12 (5%)
Pelvic adhesion	28 (12%)
Cervical incompetence	3 (1%)
Normal HSG	56 (24.8%)
n=225(100%)	

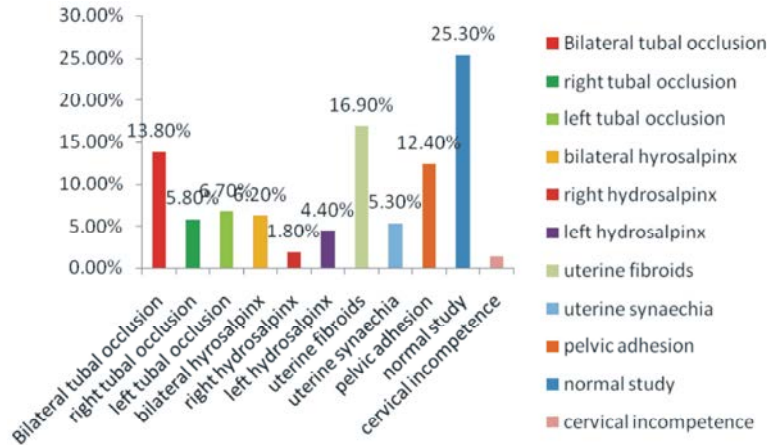


Fig. 1: Bar chart showing HSG findings

DISCUSSION

HSG is a very popular radiographic procedure in the investigation of female infertility. It is known to be very efficient in the detection of mechanical causes of female infertility such as tubal occlusion, pelvic masses and peritubal abnormalities [16]. The x-ray department of the hospital studied is a very busy one and receives more than 400 HSG referrals annually. Plain HSG is essentially a semi-invasive fluoroscopic procedure that is relatively safe and easy to perform.

Irrespective of clinical information provided by referring physicians within the period studied, only the traditional form of HSG examination was performed in the center within that period. Whereas the center had newly installed ultrasound scanners, neither Sono-HSG nor HyCoSy was performed. Lap and Dye test was also not part of clinical workup of infertility in the center within the period studied (Lap and Dye is not totally a radiologic procedure though). Whereas the traditional form of HSG may reliably indicate tubal occlusion, it is, however, not a reliable indicator of tubal patency [1,4,13]. It is to be noted that sonography now plays a vital role in the screening of tubal patency with HyCoSy having good statistical comparability and concordance with HSG and laparoscopy. Moreover, Sono-HSG is specifically indicated in cases of recurrent miscarriage [12]. Furthermore, it has been suggested that women with comorbidities such as pelvic inflammatory disease (PID) should be offered lap and dye test so that other pelvic pathologies can be assessed at the same time [4]. Furthermore, since sonography was available in the center during the period of the study; its potentials were not fully exploited. Consequently, it can be argued that

some patients may have unwittingly been subjected to unwarranted exposures to ionizing radiation in the center. Moreover, Leech-Wilkinson uterine cannula then in use in the center is no doubt, much more abrasive and traumatizing compared to plastic, disposable cannula now available, hence the procedure in the center may have been more uncomfortable than it should. It may therefore, be logical to state that HSG technique carried out in the center studied appears not in tune with current imaging best practices.

Six (2.5%) HSG examinations were inconclusive due to inability to cannulate the cervix. Furthermore, 7 (2.9%) of examinations were adjudged non-diagnostic due to excessive contrast intravasation into tiny pelvic blood vessels. In such cases, patients involved were asked to come for re-booking when their next menstrual flow commenced. The practice committee of American Society of Reproductive Medicine [5] suggests, for instances, that in cases where cannulation is very difficult or impossible, Lap and Dye test could be the alternative to the traditional form of HSG. This implies then that reliance on only the traditional form of HSG as was the case in our center within the study period may have been detrimental to some patients. However, it may not have been unlikely that some patients were inappropriately booked for the investigation or that instrumentation was poor during the procedure.

The study found that women in the reproductive age groups (22 – 27, 28 – 33 and 34 – 39 years) were the most referred for HSG, with a sharp decline in HSG referrals among women in the 46 – 51 years age bracket. This agrees with the fact that fecundity in women wanes as they advance in age. The minimum age of women (22 years) who were referred for HSG accounted for 9.0% of

the population studied. Similar studies had earlier reported that in the southwest and northeast of the country, the minimum ages of women referred for HSG were 25 years and 15 years respectively. The differences in age of the women may not be unconnected with socio-cultural, tribal/ethnic and even religious beliefs which affect age of marriage of women in different parts of the country [17,18].

Secondary infertility among the women studied was very high (70.0%). Similar studies had earlier reported a preponderance of cases of secondary infertility among women in Sub-Saharan Africa [2,19]. This may not be unconnected with sexually transmitted infections (STIs) such as gonorrhoea and pelvic inflammatory disease (PID) that is endemic in most developing countries. This result seems to agree with Patil [20] and Collet *et al.* [21] who reported in their respective studies that PID was the major cause of secondary infertility in India and central Africa Republic respectively. The result of the study does not however, agree with Admassie and Nedatuy's report [22]. In their study, primary infertility was more prevalent in Ethiopia.

Tubal pathology was a major HSG finding among infertile women in Benin metropolis, Nigeria within the period studied. While tubal occlusion (bilateral or unilateral), for instance, accounted for 27.0% of all HSG detected causes of female infertility, hydrosalpinx accounted for 12.0% (table 3 and figure 1). Since Lash *et al.*, [23] had previously established an association between secondary infertility and fallopian tube occlusion, these results further stress the fact that infection may have been a major cause of infertility among the population studied. Cases of tubal occlusion found in the study is higher than 9.0% reported by Akintola *et al.* [24] in Lagos, southwest Nigeria but less than what was reported in Uganda by Kiguli-Mlawade and Byanyima [25]. These differences may likely be attributable to differences in technique.

A high incidence (17.0%) of uterine fibroids found in this study appears to align with the fact that uterine fibroids are common among black women [16]. This result is however, less than 26.0% and 52.0% incidence rates reported by Mgbor *et al.* [26] and Olotu *et al.* [18] in the Southeast and South-south regions of Nigeria respectively. Bukar *et al.* [17] however, reported an 11.0% incidence of fibroids among women in the northeast of Nigeria. These differences raise the question as to whether there are ethnic/environmental factors affecting the incidence of fibroids among black women.

Uterine synechia is the adhesion within the endometrial cavity, either as a result of previous infection or due to poorly executed dilatation and curettage [3]. Incidence of synechia (5.0%) in our study is lower than 13.0% incidence reported in a similar study in northeast, Nigeria. Furthermore, the 12.0% incidence of pelvic adhesion found in this study favorably compares with the incidence rate reported in a population of women in Northeast of Nigeria [17]. These differences in the incidence of uterine synechia may not be unconnected with different life styles of women in the different regions whereas the incidence of pelvic adhesion may be a pointer to the prevalence of preventable infections in the whole country. It has, however, been suggested that an interplay of technical inadequacies and/or poor patient relaxation often result in cornual spasm, hence difficulty is generally associated with routine HSG diagnoses of peritubal and tubal adhesions [19,23]. This implies that the incidence of pelvic and tubal factor infertility may have been under reported thus making comparison of results rather difficult.

A major limitation of this study would be that the sample size studied appears too small compared to a country as populous as Nigeria. Moreover, we could not determine the sensitivity and specificity of routine HSG in the detection of uterine lesions against Sono- HSG, HyCoSy or Lap and Dye test since these imaging modalities are known to be more sensitive than routine HSG in the detection of intrauterine anomalies and adhesions [1,4]. A correlation of HSG findings with histopathological findings to shed more light on the role played by infection in infertility could have also improved the quality of the study.

CONCLUSION

The techniques of traditional HSG and a spectrum of common causes of infertility among infertile women detected in a tertiary hospital in Benin City, Nigeria have been described. Traditional form of HSG being performed in the center during the period studied, though not in tune with current imaging best practices, still played a significant role in the detection of uterine causes of female infertility.

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