

ORIGINAL RESEARCH

Hysterosalpingogram findings among women with infertility in Ogun State, Nigeria

Olatunji AA^{*1}, Jagun OE², Toyobo OO¹, Ashaolu OA¹, Adekoya OA¹

¹Department of Radiology, ²Department of Obstetrics and Gynaecology, Olabisi Onabanjo University Teaching Hospital, Sagamu, Nigeria.

*Correspondence: Dr. AA Olatunji, Department of Radiology, Olabisi Onabanjo University Teaching Hospital, Sagamu, Nigeria. Tel: +234-8056715826;
Email: ayodeji.olatunji@yahoo.com; ORCID: <http://orcid.org/0000-0002-2011-2902>

Abstract

Background: Infertility is a relatively common health challenge in the society with social and psychological consequences. Hysterosalpingogram (HSG) is traditionally used to ascertain some of the causes of infertility. The use of ionizing radiation and contrast media injection with the possibility of complications, make new imaging modalities preferable, especially when in-vitro fertilization is being considered as a management option.

Objective: To describe the pattern of the cervical, uterine, tubal and adnexial abnormalities causing infertility as detected by HSG in a tertiary health care institution, and demonstrate the prospects of retaining Hysterosalpingography in the investigation of female infertility.

Methods: The HSG and reports of 124 patients referred to the Radiology Department of a tertiary health facility between January, 2013 and June, 2014, at a tertiary healthcare institution, were reviewed for abnormalities in the cervix, uterus, the fallopian tubes and adnexial structures.

Results: Secondary infertility was the commonest indication for the procedure among in 66 of the 124 HSG reviewed. Pathologies in the cervix were found in 66 (51.6%) cases, of which the most frequent abnormality was cervical fibrosis in 59.4% (36/66) cases. Uterine abnormalities were found in 71.7% (89/124) cases, with uterine fibroid occurring in 82% (73/89) of these cases. Pathologies in the Fallopian tube occurred in 68 (54.8%) cases, with bilaterally blocked tubes occurring most frequently in 32.4% (22/68). Twenty-seven of the 68 cases (39.7%) with tubal abnormalities were aged 20-29 years.

Conclusion: Secondary infertility was the commonest indication for HSG in the study, while uterine fibroid, cervical fibrosis and bilaterally blocked tubes were the most prominent findings in descending order of frequency. Therefore, caution should be exercised in managing pelvic infections, inflammations, diagnostic dilation and curettage and post-abortal and post-surgical periods in order to reduce the risk of fibrosis.

Key Words: Findings, Hysterosalpingogram, Imaging technique, Infertility.

Introduction

Infertility is a common gynaecological condition affecting about 15% of couples trying to conceive. ^[1]

The prevalence of infertility in most countries of Sub-Saharan Africa exceeds 15%, while in the United Kingdom and the United States of America, it is estimated to be about 6% and 10% respectively. ^[2] In some parts of Nigeria, the prevalence is as high as 45%. ^[3] Among many African communities, infertility is associated with several stigmas, marital disharmony, social rejection and physical violence against women. ^[4]

© 2017. Annals of Health Research. The Journal reserves the right to grant on request, permissions to copy, use or distribute this material.

www.annalsofhealthresearch.com

Clinical evaluation of infertility involves the investigation of both the female and male factors that might be responsible. Hysterosalpingogram (HSG) is one of the investigative procedures for infertility among women; it involves the injection of a contrast medium into the uterus following adequate cannulation of the cervical canal. HSG is an important screening test for the diagnosis of cervical, uterine and Fallopian tubal factors in the work-up of women with infertility. Other investigative modalities include trans-vaginal ultrasonography, hysteroscopy, and laparoscopy and dye test with chromopertubation, sonohysterosalpingography and pelvic magnetic resonance hysterosalpingogram (MR-HSG).^[5,6]

The procedure is normally performed during the follicular phase of the menstrual cycle. In advanced countries, this test is carried out under fluoroscopic guidance with image intensifiers for best results. However, in most Sub-Saharan African countries, HSG is usually carried out without fluoroscopic guidance for reasons which include lack of equipment and frequent breakdown in the absence of appropriate maintenance. The combination of HSG and pelvic ultrasonography are the commonest investigations used, most probably because of their relative availability and cost-effectiveness. As the economy improves and the quality of health care gets better, other more current techniques such as the Hysterosalpingo-contrast sonography (HYCOSY) or sonohysterosalpingogram, Magnetic Resonance-HSG and Hysteroscopy, may become more available and affordable.

In a resource-limited setting, cost remains an important determinant of the choice of investigative procedures. Therefore, other expensive procedures such as laparoscopic chromopertubation,^[5] which is regarded as the Gold standard in the diagnosis of tubal disease remain in limited use. The desire for a diagnostic procedure that is relatively affordable and useful has preserved HSG as a front line investigation for infertility in resource-limited settings. The present study was carried out to describe the prevalence of cervical, uterine, tubal, and adnexial abnormalities among women with infertility using HSG given the non-availability of more modern but more expensive techniques. The study findings may guide the direction of emphasis when medical practitioners investigate and manage infertility.

Methods

This is a retrospective study of carried out at the Department of Radiology of a tertiary health care

institution between January 2013 and June 2014. The patients were women seeking care for infertility and were referred from the Department of Obstetrics and Gynaecology of the institution, and other secondary health care facilities and private hospitals in the locality. Information and images were recorded without link to the identity of the subjects in concordance with the principles of the Helsinki Declaration.

The investigation request forms, radiologist's reports as well as the HSG films (where available) were reviewed. The information extracted from the record included age, indication for studies, previous obstetric and gynaecological history such as parity and history of previous surgeries. Other information gathered from the records included the varying radiographic findings during the procedure as the cervix, uterus, fallopian tubes were concerned as well as the situation in the delayed radiographs indicating adhesions and or normal peritoneal absorption of contrast. Interesting incidental findings noted during the procedure such as bone pathologies and the results of any further imaging studies were also recorded.

The data obtained were analyzed using Statistical Package for Social Sciences (SPSS) version 11. Proportions were compared using the Chi-Square test and the level of statistical significance was set at $P < 0.05$.

Results

During the period of study, a total of 124 women had Hysterosalpingogram. Table I shows the frequency and site of abnormalities detected on HSG, the mean age of the patients, and the types of infertility. The age ranged between 19 and 45 years with a mean of 33.8 ± 5.0 years. Eighty-two (66.1%) of the 124 patients were in the 20-39 year age group, 24 (19.4%) were aged below 20 years while 18 (14.5%) were aged 40 years and above.

Secondary infertility was the indication for the procedure in 64 (51.6%) cases, while primary infertility and other clinical conditions were the indications among 25 (20.2%) cases. The request forms for 10 (8.1%) cases did not indicate the indication for the HSG, while the other patients had sub-fertility (10; 8.1%), Asherman's syndrome (2; 1.6%), huge uterine fibroid (4; 3.2%) and amenorrhoea (3; 2.4%).

Abnormalities were found among 115 (93.8%) women either in the cervix, uterus, Fallopian tubes, or in a combination of two or the three structures. Thirty-nine (31.5%) women had abnormality in a single anatomical site of cervix, uterus, or tube, while 51 (41.1%) had abnormalities affecting multiple (two or three) sites.

Abnormalities involving two (uterus & tube) and three (cervix, uterus and tubes) sites had the highest frequencies, occurring in 27 (21.8%) each. This was followed by those involving the cervix and uterus among 18 (14.5%) women.

Table II shows the frequency of abnormalities distributed according to age groups. Women aged 20-

29 years had the highest frequency of 35.5% (44/124), followed by 30.6% among those aged 30-39 years and 14.4% among those aged 40 years and above. Abnormalities spanning through the cervix, uterus, and tube were most frequent in the 20-29 years age group (14/44; 31.8%), while abnormalities were found in all the women (n = 18) above 40 years of age.

Table III shows the frequency of abnormal findings, according to the organ involved irrespective of the various combinations. The uterus had abnormalities in 89 (71.7%) cases, followed by the fallopian tubes in 69 (55.6%) cases and cervix in 60 (48.4%) cases. The abnormalities were found in at least one site among 115 (92.7%) women.

Table I: Frequency and site of abnormalities, mean age of the patients, and types of infertility

Anatomic area	Frequency	Mean age	Frequency of Indication for Investigation				Total
			Primary Infertility	Secondary Infertility	Not stated	Others	
Cervix only	13 (10.5%)	32.0	3	6	1	3	13
Uterus only	15 (12.1%)	32.6	3	6	3	3	15
Tube only	11 (8.9%)	34.5	2	6	1	2	11
Cervix and Uterus	18 (14.5%)	34.6	3	10	1	4	18
Uterus and Tube	6 (4.8%)	35.0	3	0	0	0	6
Cervix and Tube	25 (20.2%)	32.0	4	9	2	10	25
Cervix, Uterus, and Tube	27 (21.8%)	34.9	6	17	1	3	27
None	9 (7.2%)	31.2	1	7	1	0	9
Total	124 (100%)	33.8	25	64	10	25	124

Table II: Frequency of abnormalities distributed according to age groups

Age group (Years)	Frequency of site of abnormalities							Total	
	Cervix only	Uterus only	Tube only	Cervix & Uterus	Cervix & Tube	Uterus & Tube	Cervix, Uterus, & Tube		
>20	4	6	3	2	1	3	1	4	24 (19.4%)
20-29	6	4	2	4	3	8	14	3	44 (35.5%)
30-39	2	3	4	9	2	9	7	2	38 (30.6%)
=40	1	2	2	3	0	5	5	0	18 (14.5%)
Total	13	15	11	18	6	25	27	9	124 (100%)

Table IV shows the patterns of cervical, uterine and tubal findings on HSG. Abnormal cervical findings were recorded among 66 (53.2%) women, with cervical fibrosis constituting the majority 36 (29.0%). There were 15 (12.1%) women with irregular cervical outline (cervicitis), 13 (10.5%) with cervical fibroid, 3 (4.7%) with utero-cervical fibroid while 1 (0.8%) had

cervical incompetence and poorly outlined cervix. Thirty-five (28.2%) women had a normal uterus while 89 (71.7%) had abnormal uterine findings. The abnormalities included uterine fibroid (Figure 1) in 73 (58.9%), uterine fibrosis in 14 (11.3%) while poor differentiation and congenital defect was found in 1 (0.8%) case each.

Table III: Frequency of abnormal HSG findings distributed according to the organ involved irrespective of combination.

Site	Normal	Abnormal	Total
Cervical canal	64 (51.6%)	60 (48.4%)	124 (100%)
Uterus cavity	35 (28.2%)	89 (71.7%)	124 (100%)
Fallopian Tubes	55 (44.4%)	69 (55.6%)	124(100%)

Table IV: Patterns of cervical, uterine and tubal findings on HSG

Sections	Investigated Sites					
	Cervix		Uterus		Tubes	
Type and Frequency of findings	Findings (%)	Frequency	Findings (%)	Frequency (%)	Findings	Frequency
	Cervicitis	15 (12.1)	Fibrosis/ Adhesion	14 (11.3)	Unilateral blocked	16 (13.0)
	Fibroids	13 (10.5)	Fibroid	73 (58.9)	Bilateral blocked	22 (17.7)
	Fibrosis/ Stenosis	36 (29.0)	Poor differentiation	1 (0.8)	Unilateral beading	1 (0.8)
	Incompetence	1 (0.8)	Congenital	1 (0.8)	Bilateral beading	3 (2.4)
	Poor differentiation	1 (0.8)			Unilateral hydrosalpinx	8 (6.5)
					Bilateral hydrosalpinx	6 (4.8)
					Combined hydrosalpinx/blocked	2 (1.6)
					Tubes not outlined	9 (7.3)
	Cause not found	58 (46.8)	Cause not found	35 (28.2)	Cause not found	56 (45.2)
Total		124		124		124

Figure 1: Hysterosalpingograph showing uterine fibroids



Hysterosalpingogram

Both Fallopian tubes were normal in 56 (45.2 %), tubal abnormalities were found among 68 (54.8%); these comprised bilateral blocked tubes (Figure 2) in 22 (17.7%), bilateral hydrosalpinx in 6 (4.8%) and bilateral beaded appearance (gonococcal salpingitis) in 3(2.4%) cases.

Among the women with unilateral abnormalities, hydrosalpinx occurred among 8 (6.5%) cases (with 5 on the right and 3 on the left sides), unilaterally blocked tube in 16 (13.0%) cases (8 each on the right and left sides), and left-sided beaded tube was found in 1(0.8%) woman. One woman had a congenital septated uterus (Figure 3) and tubes.

However, in 9 (7.3%) of the women, Fallopian tubes were not outlined at all during the procedure despite adequate volume of contrast injection. Other radiological findings associated with abnormal HSG reports were recorded among 73 women, including pelvic adhesions in 22 cases, peritubal adhesions in 16 cases, Asherman's syndrome in 6 cases, spina bifida occulta in 5 cases, while unusual anatomically pulled-up Fallopian tubes was noted in only one woman.

Figure 2: Hysterosalpingograph showing bilateral tubal blockage



Figure 3: Hysterosalpingograph showing Congenital Septate Uterus (Didelphis)



Discussion

Hysterosalpingography (HSG) is an important, commonly performed radiologic procedure in the investigation of infertility in spite of the recent advances in reproductive medicine. The preference for HSG is based on its lower cost compared to other more sophisticated procedures, regardless of the possible side effects associated with the use of contrast media. Understandably, the age group most commonly encountered in this study was the 20-40years group with a mean of 33.8 ± 5.0 years, which coincides with the most sexually active and reproductive population in this society. It reflects newly married women, just settling down to family life after graduating from higher institutions of learning and in the early period of employment. This pattern compared well with the observations made by other authors,^[3, 112, 13] although a lower mean age was reported in a study from Abakaliki, South east Nigeria in 2008,^[14] as well as the Ugandan series (26-30 years)^[15] and 21-35 years reported in India.^[16] This finding also appears to lend credence to the statement that “the biological clock is a major adversary to human reproduction”, which not only means a reduction in fecundity associated with increasing age, but also a probable reduction in emotional reserve.^[17] The higher mean age of women with infertility observed in the present study reflects the high proportion of women with tertiary education associated with relative lateness in marriage. The other possible reason may be a general preference for initial care-seeking visits to alternative health care centres (prayer houses, herbalists and spiritualists), before recourse to orthodox health facilities.

The most frequent clinical indication for HSG in the present study was secondary infertility. This is in agreement with other researchers in the country especially,^[18-20] and in Uganda.^[15] This pattern may be due to the a relatively high frequency of inadequately managed pelvic infections, mismanaged pregnancy or normal delivery, post-abortual sepsis, sexually transmitted infections, post-operative infections,^[15] and dilatation and curettage procedures commonly carried out for endometrial cytology.

The most frequent abnormality recorded in the study was uterine abnormality, consisting of uterine fibroid, uterine fibrosis, and utero-cervical adhesions or fibrosis. The location of a fibroid within the uterus influences its effect on fertility. While subserosal fibroids do not appear to impact on fertility outcome, intramural and submucosal fibroids are associated with reduced fertility and a higher rate of

spontaneous abortion.^[21] The frequency of uterine fibroids observed in the present study is higher than the 40-50% previously observed in that of Ait Benkaddour,^[10] although the pattern agrees with the observation that intrauterine lesions are a lot more frequently encountered among women with infertility.^[10] These lesions can interfere with spontaneous conception and compromise pregnancy rates in assisted reproduction. The finding in the present study also agrees with the prior knowledge that uterine fibroids are common in this environment; occurring in as much as 20-30% of women above the age of 30 years and 3-9 times in blacks than Caucasians.^[22]

Less than half of the cases, (45.2%) had normal tubes in the present study in agreement with the reported prevalence of 40% from the University of Ilorin Teaching Hospital (UITH), Ilorin, North-central Nigeria and 43.5% from the Southeast Nigeria,^[16, 17] but lower than the rate of 62% previously reported from Burkina-Faso.^[23] The observed prevalence of bilateral tubal blockade of 17.7% in the present study is similar to the 18.7% reported from Nnewi but higher than 4% reported from Port-Harcourt.^[24] On the other hand, this study found bilateral hydrosalpinx in 4.6% of the cases compared with the 8.8% reported from Nnewi, but similar to the 5% found in Port-Harcourt.^[24] The observed predominance of right-sided unilateral hydrosalpinx compared with the left-sided lesions agreed with the findings of Okafor *et al* in Nnewi, Nigeria.^[3] The low incidences of bilaterally and unilaterally beaded tubes in 2.4% and 0.8% cases, respectively, probably reflects a relatively low rate of Gonococcus-related infertility in the setting.

Cervical fibrosis was the most frequent cervical abnormality occurring in 29% of the cases. This observation was consistent with the findings of other authors in Nigeria.^[3, 19, 20] This may be related to the high incidence of genital tract instrumentation, particularly during voluntary procurement of abortions or management of deliveries. The other probable explanation is the frequent use of dilation and curettage for cytology in poorly trained hands while investigating infertility.

The abnormalities recorded in the present study were significantly higher in the 20-39 years age group across the pathologies seen. The women in this age bracket are more likely to present with cervical fibrosis, uterine leiomyomas, or tubal blockage. On the other hand, women above the age of 39 years have a low frequency of such pathologies. Of the other

abnormalities noted in the series, florid pelvic adhesions and peri-fimbrial adhesions occurred more frequently than others. This observation suggests that secondary infertility in these women might be due to poorly treated or sub-clinical pelvic inflammatory diseases.

Conclusion

Infertility is a major gynaecological problem, especially in the developing countries. The high incidence of uterine pathology, with remarkable involvement of the cervical and tubal factors detected by HSG in the study suggests that HSG is still valuable in the investigation of infertility. Improvements in the management of pelvic inflammatory diseases and unwanted pregnancies, which commonly predispose to tubal blockage and Asherman syndrome, respectively, may play a significant role in reducing the incidence of infertility in Nigeria.

Authors' Contributions: OAA designed the study. OAA and JEO did the literature search while AOA1 and AOA2 participated in data collection and analysis and review of the manuscript. TOO participated in the review of the manuscript. All the authors approved the final version of the manuscript.

Conflict of Interest: None.

Funding: Self-funded but with equipment and staff support by the Olabisi Onabanjo University Teaching Hospital, Sagamu.

Publication History: Submitted 19-March 2017; Revised 19-July 2017; Accepted 05-August 2017

References

1. McLaren JF. Infertility evaluation. *Obstet Gynecol Clin North Am* 2012; 39: 453-63.
2. Theodore A, Baramki MD. Modern trends in hysterosalpingography. *Fertil Steril* 2005; 83:1595-606.
3. Okafor CO, Okafor CI, Okpala OC, Umeh E. The pattern of hysterosalpingographic findings in women being investigated for infertility in Nnewi, Nigeria. *Niger J Clin Pract* 2010; 13: 264-67.
4. Okonofua FE. Infertility in Sub-Saharan Africa. In: Okonofua F, Odunsi K.(eds). *Contemporary Obstetrics and Gynaecology for Developing Countries*. Benin-City, Nigeria, WHARC. 2003: pp 128-156.
5. Sadow CA, Sahni VA. Imaging female Infertility. *Abdom Imaging* 2014; 39: 92-107.
6. Kdous M. Hysterosalpingography in the assessment of tubal patency. *La Tunisie Medicale* 2006; 84(8): 520-25.

Hysterosalpingogram

7. Marci R, Marcucci I, Marcucci AA, Pacini N, Salacone P, Sebastianelli A, *et al.* Hysterosalpingocontrast Sonography (HyCoSy): evaluation of the pain perception, side effects and complications. *BMC Med Imaging* 2013;13:28.
8. De Felice C, Rech F, Marini A, Stagnitti A, Valente F, Cipolla V, *et al.* Magnetic resonance hysterosalpingography in the evaluation of tubal patency in infertile women: an observational study. *Clin Exp Obstet Gynecol* 2012;39: 83-8.
9. Dudiak CM, Turner DA, Patel SK, Archie JT, Silver B, Norusis M. Uterine leiomyomas in the infertile patient: preoperative localization with MR imaging versus US and hysterosalpingography. *Radiology* 1988; 167: 627-30.
10. Ait Benkaddour Y, Gervaise A, Fernandez H. Which is the method of choice for evaluating uterine cavity in infertility workup? *J Gynecol Obstet Bio Reprod* 2010;39: 606-13.
11. Bosteels J, Kasius J, Weyers S, Broekmans FJ, Mol BW, D'Hooghe TM. Hysteroscopy for treating subfertility associated with suspected major uterine cavity abnormalities. *Cochane Database Syst Rev.* 2013;1: CD009461. DOI: 10. 1002/14651858. CD009461.pub2.
12. Malek-Mellouli M, Gharbi H, Rezig H. The value of sonohysterography in the diagnosis of tubal patency among infertile patients. *Tunis Med* 2003;91: 387-90.
13. Daaloul W, Ouerdiane N, Masmoudi A, Ben Hamouda S, Bouguerra B, Sfar R. Epidemiological profile, etiological diagnosis and prognosis of uterine synechias: report of 86 cases. *Tunis Med* 2012; 90: 306-10.
14. Kiguli-Malwadde E¹, .Byanyima RK. Structural findings at hysterosalpingography in patients with infertility at two private clinics in Kampala, Uganda. *Afr. Health Sci.* 2004;4: 178-81.
15. Imo AO, Sunday-Adeoye I. Radiological assessment of the uterus and fallopian tubes in infertile women in Abakaliki, Nigeria. *Niger J Clin Pract* 2008; 11: 211-15.
16. Malhotra N, Sood M. Role of hysteroscopy in infertile women. *J Indian Med Assoc* 1997;95: 499-525.
17. Hatasaka H. An efficient infertility evaluation. *Clin Obstet Gynecol* 2011;54: 644-55.
18. Bukar M, Mustapha Z, Takai UI, Tahir A. Hysterosalpingographic findings in infertile women: a seven year review. *Niger J Clin Pract* 2011;14: 168-70.
19. Ibekwe PC, Udensi AM, Imo AO. Hysterosalpingographic findings in patients with infertility in South eastern Nigeria. *Niger J Med* 2010; 19:165-67.
20. Bello TO. Tubal abnormalities on hysterosalpingography in primary and secondary infertility. *West Afr J Med* 2006;25: 130-33.
21. Kroon B, Johnson N, Chapman M, Yazdani A, Hart R; Australasian CREI Consensus Expert Panel on Trial evidence (ACCEPT) group. Fibroids in infertility Consensus Statement from ACCEPT (Australasian CREI Consensus Expert Panel on Trial evidence). *Aust N Z J Obstet Gynaecol* 2011;51: 289-95.
22. Ogedengbe OK. Uterine Fibroids. In: Okonofua F and Odunsi K. (eds) *Contemporary Obstetrics and Gynaecology for developing Countries.* Benin-City, Nigeria. WHARC. 2003: pp 202-213.
23. Cisse R, Louge C, Ouegraogo A, Thieba B, Tapsoba T, Ouedraogo CM, *et al.* Feature of hysterosalpingography performed in Burkina Faso. *J Radiol* 2003; 83: 361-41.
24. Nwankwo NC, Akani CI. Pattern of Hysterosalpingographic findings in infertility in Port Harcourt. *West Afr J Radiol* 2005; 12: 15-19.