**HYSTEROSALPINGOGRAM FINDINGS IN INFERTILE WOMEN IN OGUN STATE, NIGERIA**

**ABSTRACT:**

**Background:** Infertility is a relatively common problem in our society with social and psychological consequences. Hysterosalpingogram (HSG), is traditionally used to ascertain some of the causes of infertility. The involvement 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 present the  status of the cervical, tubal and adnexial abnormalities causing infertility in a tertiary healthcare institution, and demonstrate the continuing value of retaining Hysterosalpingography.

**Materials and Methods:** The HSG and reports of 124 patients referred to Radiology department from January, 2013 to June, 2014, at a tertiary healthcare institution, were reviewed for abnormalities in the cervix, uterus and the fallopian tubes.

**Results:** Secondary infertility was the commonest indication seen in 66 of the 124 HSG reviewed carried out. Pathologies in the cervix was found in 51.6%(66/124), of which the most frequent abnormality is cervical fibrosis occurring in 36/66(59.4%). Abnormalities in the uterus was found in 89/124 patients, with uterine fibroid occurring in 73(72.0%). Pathologies in the fallopian tube occurred in 68/124(54.8%) cases, with bilaterally blocked tubes occurring most frequently in 22/68(32.4%). Twenty-seven (39%) of the tubal abnormalities occured in women aged 20-29 years. Although uterine abnormality was the most prevalent, tubal abnormalities was most prevalent among the 20-29 age group.

**Conclusion:** Secondary infertility is the commonest indication for HSG in our study, while uterine fibroid, cervical fibrosis and bilateral blocked tubes are most significant in descending order of frequency. Caution should therefore be exercised in managing pelvic infections, inflammations, post abortal and post surgical periods, and diagnostic dilation and curettage in order to reduce the risk of fibrosis.

Key Words: Hysterosalpingogram, Infertility, Investigation , Investigation

**INTRODUCTION:**

Infertility is a common condition, affecting 15% of couples trying to conceive¹. The prevalence of infertility in most countries of sub-Saharan Africa exceeds 15%, while in the United Kingdom and the United States, it is estimated to be about 6% and 10% respectively². In some parts of Nigeria it is as high as 45%³. Infertility in most African communities carries several stigmas, causing marital disharmony, social rejection and physical violence against women⁴. The evaluation of infertility involves the investigation of both the female and male factors that might be responsible.

Hysterosalpingogram (HSG) is one of the investigations carried out in infertile women involving the injection of a contrast medium into the uterus after adequate canulation of the cervical canal. It is also an important screening test for the diagnosis of cervical, uterine and fallopian tubal factors in the work up of the infertile couples. Other investigative modalities include vaginal transvaginal ultrasonography**,** hysteroscopy, and laparoscopy and dye test with chromopertubation, sonohysterosalpingography and pelvic magnetic resonance hysterosalpingogram (MR-HSG) ⁵ʹ⁶. HSG is normally performed in 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 a variety of reasons including lack of equipment and frequent breakdown in the absence of appropriate maintenance culture. The combination of HSG and pelvic ultrasonography are the commonest of the investigations used most probably because of their relative availability and cost effetiveness. As the economy improves, other more current techniques such as Hysterosalpingo-contrast sonography (HYCOSY) or sonohyterosalpingogram, Magnetic Resonance-HSG, and Hysteroscopy, will become more available and affordable.

In a resource limited community like ours, cost remains an important consideration for investigative procedures. Therefore, other expensive procedures such as Laparoscopic chromopertubation⁵, which is regarded as the Gold standard in the diagnosis of tubal disease remain in limited use. As a result, the desire for a diagnostic procedure that is relatively affordable and useful has kept HSG in the front line of the investigations of the infertile couple over the years, and it is likely to continue to be so for some time.

The present study is being carried out to present the prevalence of cervical, uterine, tubal, and adnexial abnormalities in the female patients with infertility using HSG to demonstrate its continuing capability in demonstrating the changes associated with infertility in resource limited environment such as ours, where newer and modern techniques are yet to be available. The study findings will also form a basis to advise practitioners on where greater emphasis should be place in order to reduce morbidity and infertility.

**MATERIALS AND METHODS:**

This is a retrospective study of HSG by Radiologists in the department of Radiology of a tertiary health care institution from January 2013-June 2014.. The patients were referred from the Obstetrics and Gynaecology department of institution, and other secondary health care facilities and private hospitals in the locality. The request forms, radiologists report as well as HSG films (where available) were reviewed. Data extracted included age, indication for studies, previous obstetric and gynecologic history such as parity and previous surgeries done. Other information of interest included the varying radiographic findings during the procedure involving cervix, uterus, fallopian tubes 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 were recorded. Any further imaging carried out on the patient was also noted.

Information and images were recorded without link to the subjects in line with the principle of the Helsinki Declaration.

The data obtained were analyzed using Statistical Package for Social Sciences (SPSS) version 11 and presented in tables and figures. Proportions were compared using the Chi Square test and the level of statiscal significance of the study findings was set at p < 0.05.

**RESULTS:**

During the period under review, a total of 124 female patients had Hysterosalpingogram.

Table 1 shows the frequency and site of abnormalities, mean age of the patients, and types of infertility. Their age ranged between 19 and 45 years with a mean of 33.83 ± 5.03 years. Eighty-two of the 124 patients (66.1%), were in the 20-39 year range, 24 (19.4%) were below 20 years, and 18 (14.5%) were 40 years and above.

Secondary infertility was the indication in 64(51.6%)of the patients, while primary infertility and other clinical conditions were the indications in 25 (20.2%) patients. 10 (8.1%) patients’ request cared did not state the reason for the HSG, while patients with ‘other clinical conditions’ had sub fertility 10(8.1%), Asherman’s syndrome 2(1.61%), huge uterine fibroid 4(3.23%) and amenorrhea 3 (2.4%).

Abnormalities were found in 115 (93.8%) of the women investigated either in the cervix, uterus, fallopian tubes, or in a combination of two or the three structures. Thirty-nine (31.5%) of the women had abnormality in one of cervix, uterus, or tube, while 51 (41.1%) had abnormalities in multiple (two or three) sites. Abnormalities involving the two (uterus & tube) and three (cervix, uterus, & tubes) sections had the highest frequencies, occuring in 27 (21.8%) each, followed by those involving the cervix and uterus, found in 18 (14.5%).

Table 2 shows frequency of abnormalities according to age groups. The highest frequency of 35.5% (44/124) was recorded for women aged 20-29 years, followed by 30.6% in those in the 30-39 age group, and 14.4% in those aged 40 years and above. Abnormalities spanning through the cervix, uterus, and tube was highest 14/44 in the 20-29 years age group, while abnormalities were found in all (18) patients above 40 years of age.

Table 3 shows the frequency of abnormal findings according to the organ irrespective of combination. The uterus was affected in Abnormalities in 89 (68.5%) patients, followed by the fallopian tubes in 69 (55.6%) patients and cervix in 60 (48.4%) patients. Abnormalities were found in at least one section in 115 (92.7% of the patients.

Table 4 shows the patterns of cervical, uterine and tubal findings. Abnormal cervical findings were seen in 66(53.2%) patients, with cervical fibrosis constituting the majority 36(29%). Patients with irregular cervical outline (cervicitis) were 15(12.1%), cervical fibroid 13(10.5%), utero-cervical fibroid, 3(4.7%), while cervical incompetence and poorly outlined cervix was found in 1 (0.8%), respectively.

Thirty-five (28.2%) patients had normal uterus, while 89 (71.8%) had abnormal uterine findings. The abnormalities included uterine fibroid (Figure 2) in 73 (58.9%), uterine fibrosis 14 (11.3%), poor differentiation and congenital defect was found in 1 (0.8%) each, respectively.

Both fallopian tubes were normal in 56 (45.2 %)patients, tubal abnormalities were found in 68(54.8%) patients, made up of bilateral blocked tubes (Figure 1) in 22(17.7%), bilateral Hydrosalpinyx in 6(4.8%), and bilateral beaded appearance (gonococcal salpingitis) occurred in 3(2.4%). Among patients with unilateral abnormalities, Hydrosalpinyx occurred in 8 (6.5%) (5 on the right and 3 on the left sides), unilateral blocked tube was found in 16 (13.0%) (8 each on the right and left sides), and left-sided beaded tube was found in 1(0.8%) patient. One patient had congenital septated uterus (Figure 3) and tubes. However, in 9 (7.3%) of the patients, 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 in 73 patients, including pelvic adhesions occurring in 22 patients, perifimbrial adhesions in 16, Asherman’s syndrome in 6, Spina bifida occulta in 5, while unusual anatomically pulled-up fallopian tubes was noted in only one patient.

**DISCUSSION**

HSG remains an important commonly performed radiologic procedure in the investigation of the infertile couple in spite of recent advances in reproductive medicine. Preference for it is due to lower cost compared to other more sophisticated procedures, possible side effects associated with contrast media use notwithstanding. Understandably, the age group most commonly involved in this study was 20-40years with a mean of 33.8 ± 5.0years coincides with the most sexually active and reproductive population in this society. It consists of newly married women, just settling down to family life after graduation from higher institutions and in early period of employment. This pattern compares well with observations of other authors 3,12,13 although, a lower mean age was reported in a study from Abakaliki, South East Nigeria studies in 2008¹⁴, the Ugandan series (26-30 years)¹⁵ and 21-35 years in India¹⁶. This finding also seems 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 age but also a probable reduction in emotional reserve¹⁷. The higher mean age obtained in our study reflects the higher proportion of women with tertiary education associated with relative lateness in marriage. The other possible reason may be a general preference for initially visiting alternative care centers (prayer houses, herbalists and spiritualists) first without success, before recourse to conventional health care centre.

The commonest clinical indication for the study is secondary infertility, which is in agreement with other researchers in the country especially 18,19,20 and in Uganda¹⁵. This may probably be due to the a relative frequency of inadequately managed pelvic infections, mismanaged pregnancy or normal delivery, post-abortal sepsis, sexually transmitted infections, post operative infection¹⁵, and the common dilatation and curettage procedures done for endometrial cytology in the community.

The most frequent abnormality seen in the study is uterine abnormality, consisting of uterine fibroid, uterine fibrosis, and utero-cervical adhesions or fibrosis. The location of a fibroid within the uterus is said to influence 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 miscarriage.²¹. The frequency obtained in this study is higher than the 40-50% observed in that of Ait Benkaddour, although it agrees with the observation that intra-uterine lesions are much more common in infertile women¹⁰. These lesions can interfere with spontaneous conception and compromise pregnancy rates in assisted reproduction. Our study agrees with the observation that Uterine fibroids is common in this environment.Normal tubes were seen in only 56 (45.2%) of the 124 patients, while abnormal tubes occurred in 68(41.5%). This is in agreement with the University of Ilorin Teaching Hospital (UITH) study with incidence of 40% and the South East Nigeria findings of 43.5 %¹⁹ʹ³, although, a higher figure of 62% was recorded in the Burkina-Faso report²³. Our finding of 17.7% of bilateral blocked tubes is similar to the 18.7% found in the study from Nnewi and higher than 4% found in the study from PortHacourt24. On the other hand, we found bilateral Hydrosalpinyx in 4.6% of the patients, which is the 8.8% in Nnewi, but similar to the 5% found in PortHacourt.²⁴.The findings that unilateral Hydrosalpinyx were more frequent on the right than on the left, is in agreement with the findings of Okafor et al in Nnewi, Nigeria³. The low incidences of bilaterally and unilaterally beaded tubes in 2.4% and 0.8% respectively, probably reflects a relatively low rate of Gonococcal-related infertility in the environment.

The most frequent abnormality found in the cervix was cervical fibrosis, occurring in 29% of cases, and is consistent with the findings of other authors 3,19,20, in Nigeria. This may probably be due to a high incidence of instrumentation involved in procedures used either in procuring abortion on demand or management of deliveries. The other probable explanation may be the frequent use of dilation and curettage for cytology in poorly trained hands in investigating the infertile couple which cannot be ruled out in a society like ours.

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

Of the other abnormalities noted in the series, florid pelvic adhesions and perifimbrial adhesions occurred more frequently than others, indicating that secondary infertility in these patients might be due to poorly treated or sub clinically treated pelvic inflammatory diseases.

**CONCLUSION AND RECOMMENDATION:**

Infertility remains a major gynaecological problem, especially in developing countries. The high incidence of uterine pathology, with a significant cervical and tubal factor in this study shows that HSG is still valuable in the investigation of the infertile couples. Improvements in the management of pelvic inflammatory diseases and unwanted preganancies which commonly predispose to tubal blockage and Asherman syndrome respectively, may play a significant role in reducing the incidence of infertility in Nigeria.

**REFERENCES:**

1. McLaren JF. Infertility evaluation. Obstet Gynecol Clin North Am. 2012 39: 453-63.
2. Theodore A, Baramki MD. Modern trends in hysterosalpingography. Fertility and sterility 2005; 83:1595-1606.
3. Okafor CO, Okafor CI, Okpala OC, Umeh E. The pattern of hysterosalpingographic findings in women being investigated for infertility in Nnewi, Nigeria. Nig J of Clin Prac 2010 13: 264-267.
4. Okonofua FE. Infertility in Sub-Saharan Africa. OkonofuaF, Odunsi K.(eds). Contemporary Obtetrics and Gynaecology for Developing Countries. WHARC. Benin City , Nigeria. 2003; 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): 520-5.
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 resonancehysterosalpingography in the evaluation of tubal patency in infertile women: an observational study. Clin Exp Obtet Gynecol.2012; 39: 83-8.
9. Dudiak CM¹, 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 Jun; 167: 627-30.
10. Ait Benkaddour Y¹, Gervaise A, Fernandez H. [Which is the method of choice for evaluating uterine cavity in infertility workup?]. J Gynecol Obstet Bio Reprod. 2010 Dec;39: 606-13.
11. Bosteels J¹, 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 Jan 31;1: CD009461. DOI: 10. 1002/14651858. CD009461.pub2.
12. Malek-Mellouli M, Gharbi H, Reziga H. The value of sonohysterography in the diagnosis of tubal patency among infertile patients. Tunis Med .2003; 91 387-90.
13. Daaloul W¹, 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 AO¹, Sunday-Adeoye I. Radiological assessment of the uterus and fallopian tubes in infertile women in Abakaliki , Nigeria. Niger J .Clin Pract. 2008; 11: 211-5.
16. Malhotra N¹, 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 M¹, Mustapha Z, Takai UI, Tahir A. Hysterosalpingographic findings in infertile women: a seven year review. Niger J Clin Prac. 2011 ; 14: 168-70.
19. Ibekwe PC¹, Udensi AM, Imo AO. Hysterosalpingographic findings in patients with infertility in South eastern Nigeria. Niger J Med .2010 ;19 :165-7.
20. Bello TO. Tubal abnormalities on hysterosalpingography in primary and secondary infertility. West Afr J Med. 2006.; 25 : 130-3.
21. Kroon B¹, 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: Contemporary Obtetrics and Gynaecology for developing Countries. Okonofua F and Odunsi K. (eds). WHARC Benin-City. Nigeria 2003, 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 Radiology.2003: 83: 361-4.1

24. Nwankwo NC, Akani CI. Pattern of Hysterosalpingographic findings in infertility in Port Harcourt. West African Journal of Radiology.2005; 12: 15-19.

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Anatomic area | Frequency | Mean age | Frequency of Type of Infertility | | | | Total |
| Primary | Secondary | Not stated | Others |
| Cervix only | 11 | 32.0 | 3 | 6 | 1 | 3 | 13 |
| Uterus only | 15 | 32.6 | 3 | 6 | 3 | 3 | 15 |
| Tube only | 10 | 34.5 | 2 | 6 | 1 | 2 | 11 |
| Cervix and Uterus | 20 | 34.6 | 3 | 10 | 1 | 4 | 18 |
| Uterus and Tube | 27 | 35.0 | 3 | 3 | 0 | 0 | 6 |
| Cervix and Tube | 5 | 32.0 | 4 | 9 | 2 | 10 | 25 |
| Cervix, Uterus, and Tube | 27 | 34.9 | 6 | 17 | 1 | 3 | 27 |
| None | 9 | 31.2 | 1 | 7 | 1 | 0 | 9 |
| Total | 124 | 33.8 | 25 | 64 | 10 | 25 | 124 |

**Table II: Frequency of abnormalities according to age groups**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Age Group | | Frequency of site of abnormality | | | | | | | | | |
| **Cervix only** | **Uterus only** | **Tubes only** | **Cervix & Uterus** | **Cervix & Tube** | **Uterus & Tube** | **Cervix, Uterus & Tube** | | **None** | **Total** |
| <20 | | 3 | 6 | 3 | 2 | 1 | 4 | 1 | | 4 | 24 |
| 20-29 | | 5 | 3 | 2 | 6 | 2 | 9 | 14 | | 3 | 44 |
| 30-39 | | 2 | 3 | 3 | 9 | 2 | 9 | 7 | | 2 | 38 |
| ≥ 40 | | 1 | 2 | 2 | 3 | 0 | 5 | 5 | | 0 | 18 |
| Total | 11 | | 15 | 10 | 20 | 5 | 27 | | 27 | 9 | 124 |

**Table III: Frequency of abnormal findings according to the organ irrespective of combination.**

|  |  |  |  |
| --- | --- | --- | --- |
| Site | Normal | Abnormal | Total |
| Cervical canal | 64 (52%) | 60 (48%) | 124 (100%) |
| Uterus cavity | 35 (28%) | 89 (72%) | 124 (100%) |
| Fallopian Tubes | 55 (44%) | 69 (56%) | 124(100%) |

**Table IV: Patterns of cervical, uterine and tubal findings**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Sections | Investigated Sections | | | | | |
| **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 outlinend | 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 |