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Patterns of Tubal Abnormalities Responsible For Infertility in Makurdi, North-Central Nigeria

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Abstract
Background: *Infertility is a menace with untoward emotional, financial and sometimes traumatic consequences. This is a retrospective observational study with some interest concerning the epidemiology of tubal infertility in Nigeria. It is the experience of a single center that evaluates the outcome of HSG examination with the main objective of identifying tuberous occlusions at a private Imaging Centre in Makurdi.*
Materials and Methods*: Evaluation of all consecutive patients in whom hysterosalpingography (HSG) was performed for infertility between April 2017 and February 2019 in the center.*
Results: *There were 239 patients that were involved in this study. Of these, 228 were investigated for infertility with 18 (7.5%) cases of primary infertility and 210 (88%) cases of secondary infertility. Of the 239 patients, 128 (53.6%) patients had no pathology, while 111 (46.4%) had pathologies in the uterus, either one or both fallopian tubes. Concerning tubal occlusions, there were a total of 59(24.7%) tubal occlusions, 37(15.5%) were bilateral, 14(5.9%) were on the left and 8(3.3%) on the right. There were 52(21.7%) cases of hydrosalpinx, 26(10.9%) on the right, 22(9.1%) on the left and 4(1.7%) bilaterally. Spillage occurred in all normal cases and cases with only one anomaly including most cases with two anomalies.*
Conclusion: *The incidence of tubal occlusion and hydrosalpinx was high in patients presenting with infertility in this study. However, majority of cases of infertility had normal Salpingograms with bilateral tubal patency.*
Keywords: *Contrast material; Fallopian tube; Fluoroscopy; Hysterosalpingography; Infertility; Uterus.*

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I. Introduction

Infertility is the failure of a couple of reproductive age to conceive after 12 months or more of regular coitus without the use of condoms [1,2]. Infertility is a major global problem and is regarded as a social stigma in the Nigerian society, affecting 5-15% in developed countries and 10-20% of couples in developing countries [1].

Infertility is considered primary when it occurs in a woman who has never had an established pregnancy, and secondary when it occurs in a woman that has had a history of one or more pregnancies irrespective of the outcome [1,3]. Infertility is caused by female and/or male factors with each accounting for 35% [4]. A combination of several factors is found in approximately 20% of all couples,[4, 5] and in the remaining 10% of couples, the etiology is not known [4].

Female factor infertility could be ovarian, tubal, uterine or cervical [4]. The etiology of tubal factor infertility can be intrinsic (ascending salpingitis including salpingitis isthmic nodosa) or extrinsic (peritonitis, endometritis and pelvic surgery). The most common causes of pelvic inflammatory disease (PID) are Chlamydia Trachomatis, Neisseria gonorrhea and multibacteria infections [5, 6].

It has been estimated that PID related tubal adhesions causes 30-50% of female infertility [1] and in Nigeria, tubo-peritoneal factors have been shown to be the commonest cause of infertility contributing as much as 64% in some series due to high prevalence of sexually transmitted infections [1,7].

Fallopian tube patency, morphology of the uterus and cervix are best assessed by hysterosalpingogram, which is simple, safe and inexpensive, compared to the other methods of evaluation of these structures. It has a sensitivity of 65% and a specificity of 83% in detecting tubal blockage [8]. It has also been suggested that hysterosalpingography (HSG) has a therapeutic role in enhancing subfertility [9].

Though imaging modalities like Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) can be used to outline the female tract, these modalities are expensive and not readily available in many centers. Indeed, non-imaging modalities like laparoscopy are reported to be superior to HSG in the evaluation of tubal and pelvic pathologies, the two methods are however not alternative but complementary [10].

The aim of this study was to describe the pattern and structural abnormalities of the uterus and tubes encountered in females with infertility over a 5-year period with the use of HSG in Makurdi north central Nigeria.

Patients and method

This was a retrospective review of all HSG done at Musafaha Imaging Centre (MIC), Makurdi, Benue State. All patients in whom hysterosalpingogram (HSG) was performed for infertility between April 2017 and February 2019 were included. Demographic data such as age, parity, duration of infertility, indication for investigation were extracted from their request forms. The study was approved by the ethical committee of the Benue State University Teaching Hospital, Makurdi. Most of the patients sent to the MIC for tubal assessment were referred by Gynecologists or family doctors.

HSG examination

Patients were scheduled between the 7th and 12th day of their menstrual cycle to ensure a thin endometrium, which makes interpretation of the images easier. A preovulatory exam was performed to exclude an early pregnancy. Contraindications, beside pregnancy, included pelvic inflammatory disease, bleeding and severe allergy against iodine contrast agents. The patients were informed of possible complications and an informed consent was obtained before the procedure. An intravenous line is secured prior to the procedure, for resuscitation in case of contrast reaction and injection of Hyoscine-N-butylbromide is administered to relax the tubes and prevent tubal spasm. An antibiotic prophylaxis is administered to prevent pelvic infection.

The procedure was performed using fluoroscopy. The patient was placed in supine position on the fluoroscopy table, and a scout film of the pelvis was acquired to assess for proper positioning, technical factors and radiopaque pelvic lesions. The patient was placed in lithotomy position. Using aseptic technique, the cervix was visualized with the aid of speculum and the anterior lip held with a Volsellum forceps. A matching size Everard Williams or Leech–Wilkinson uterine cannula was inserted into the endocervical canal after sounding the uterus with a uterine sound. Maintaining a seal between the cannula and cervical canal with gentle traction on the Volsellum and pressure on the cannula, 15–20ml of water-soluble contrast medium, urografin 76% (sodium amidotrizoate+meglumineamidotrizoate) was injected slowly into the uterine cavity. The appearance of the uterine cavity and patency of the fallopian tubes were assessed by direct image intensification. Spot films during the phases of early uterine filling, tubal filling and peritoneal spill were taken. A release film was taken to check for the clearance of the contrast from the pelvic cavity, especially if there was hydrosalpinx. For the detection of minor deformities of the uterine cavity, it was essential to obtain the radiographs of the uterus in the true anteroposterior projection, and this was achieved by the cervical traction and oblique positioning of the patient where necessary. All HSG examinations were interpreted by the direct visualization of hard copy images, checking for unilateral and bilateral spillage of contrast medium into the pelvic cavity and abnormalities in the outline of the cervix and uterine cavity, which may suggest uterine anomalies [11].

Scout films (antero-posterior) of the pelvis were obtained to ascertain good radiographic factors settings and also to detect any premorbid condition.

Ethical consideration

Approval carry out the study was giving by the ethical and research committee of BSUTH.

Data analysis

Data obtained was entered into and analyzed using SPSS version 20.0 statistical software package. Continuous variables were expressed as mean ± standard deviation and chi-square test for categorical variables where appropriate.

II. Results

There were 239 patients that were involved in this study. Of these, 228 were investigated for infertility while 11were investigated for other conditions like uterine fibroids and scanty menses. Most of the patients 219 (91.7) were married and majority of them were either unemployed (43%) or students (23%). Also, Majority of them 153(64%) had tertiary education and were of the Christian faith 232 (97.1%). [Table 1]

Tables 1: Socio-demographic

Parameter	Frequency	Percentage
1. Age		
15 - 19	2	0.8
20 - 24	5	2.1
25 - 29	30	12.5
30 - 34	112	46.9
35 - 39	82	34.3
40 – 44	8	3.4

Total	239	100
2. Marital status		
Married	219	91.7
Single	17	7.1
Divorced	2	0.8
Cohabiting	1	0.4
Total	239	100
3. Occupation		
C/Servant	34	14.2
Business	9	3.8
Farming	37	15.5
Students	55	23.0
Unemployed	104	43.5
Total	239	100
4. Educ. Level		
Non	16	6.7
Primary	29	12.1
Secondary	41	17.2
Tertiary	153	64.0
Total	239	100
5. Religion		
Christianity	232	97.1
Islam	3	1.2
Others	4	1.7
Total	239	100
6. Ethnicity		
Igede	5	2.1
Idoma	32	13.4
Tiv	163	68.2
Hausa/Fulani	12	5.0
Igbo	22	9.2
Yoruba	4	1.7
Others	1	0.4
Total	239	100

There were 18 (7.5%) cases of primary infertility and 210 (88%) cases of secondary infertility. The age range was 18-41 years while the average was 31.5 (±4.8) years. The mean age of primary infertility was 29.5 years while that of secondary infertility was 32.4 years. Majority of the patients were in the age group of 30-34 years. [Table 2]

Table 2: Age distribution and indications for hysterosalpingography

Age in Years	Primary Infertility	Secondary infertility	Non-fertility indications	Total (%)
15-19	2	0	0	2 (0.8)
20 – 24	4	1	0	5 (2.1)
25 – 29	5	23	2	30 (12.5)
30 – 34	2	107	3	112 (46.9)
35 – 39	4	72	6	82 (34.3)
40 – 44	1	7	0	8 (3.4)
Total	18	210	11	239 (100)

One hundred and twenty-eight (53.6%) patients had no pathology, while 111 (46.4%) had pathologies in the uterus, either one or both fallopian tubes [Table 3][Figures 1-4]. Of the 11 patients that were investigated for non-fertility indications, 6 (54.5%) were normal, 3(27.3%) had irregular uterine contour and 2(18.2%) had uterine filling defects.

Table 3: Summary of Pattern of tubal pathology as seen on Hysterosalpingography

Pathology	Number	Percentage
Bilateral patent(normal) tubes	**128**	**53.6**
Tubal occlusions		
Bilateral tubal occlusion	37	15.5
Right tubal occlusion	8	3.3
Left tubal occlusion	14	5.9
Subtotal	**59**	**24.7**
Hydrosalpinx		
Right hydrosalpinx	26	10.9
Left hydrosalpinx	22	9.1

Bilateral hydrosalpinx	4	1.7
Subtotal	**52**	**21.7**
Total	**239**	**100**

Number of anomalies	**Spillage present**	**Spillage absent**
No anomaly	128	0
Single anomaly	59	0
Two anomalies	57	7
Three anomalies	8	7

Figure 1*: Hysterosalpingogram showing normal uterine cavity and bilateral patent tubes*

Figure 2: *Hysterosalpingogram showing a capacious uter5ine cavity which is rounded in shape in keeping with uterine mass lesion, both tubes are not patent. complementary pelvic ultrasound shows multiple uterine fibroids*

Figure 3: *Hysterosalpingogram shows a normal uterine cavity. Both tubes show contrast loculations in the distal parts in keeping with bilateral hydrosalpinges*

Figure 4: *Hysterosalpingogram shows a uterine cavity which is elongated in appearance. The outline is irregular and both tubes are not patent. the patient has a history of myomectomy*

Concerning tubal occlusions, there were a total of 59(24.7%) tubal occlusions, 37(15.5%) were bilateral, 14(5.9%) were on the left and 8(3.3%) on the right. There were 52(21.7%) cases of hydrosalpinx, 26(10.9%) on the right, 22(9.1%) on the left and 4(1.7%) bilaterally. Spillage occurred in all normal cases and cases with only one anomaly including most cases with two anomalies. [Table 3]

III. Discussion

Infertility is a menace with untoward emotional, financial and sometimes traumatic consequences. It may result in abandonment and divorce particularly in sub-Saharan Africa where the fault is assumed to lie mainly on the woman. Assisted conception has helped many overcome the hurdle, however it is not readily available and affordable [12].

HSG is one of the imaging modalities used as a first line investigation in the evaluation of infertility. It is used mainly to assess tubal factor infertility and to outline the uterine cavity [12,13]. Limitations of HSG as a

diagnostic tool for tubal abnormality is a recognized fact and a matter for debate. Some authors consider the HSG to be an indispensable test that should be performed before laparoscopy, whereas others favor omission of the HSG altogether [14]. Though there are other advanced and efficient methods of evaluating the uterine cavity and fallopian tubes in women presenting with infertility, hysterosalpingogram is still widely used because it is cheap, readily available and easy to interpret. It reveals the abnormalities in the cervix, uterus and fallopian tubes at a lower cost and noninvasively. It is readily available and usually the firstline of imaging evaluation of the fallopian tubes in infertility, especially in developing countries such as ours [11].

The age range in our study was 18-41 years. This is similar to older studies [15, 16] where this earlier presentation was attributed to early marriage. This was found in our study probably because certain communities around our environment still indulge in early marriages. Newer studies however have 20 years and above as their lower limit for HSG probably because of delay in marriage due to academic pursuit.[21]The upper age limit of our study was 41 years. This is lower than other studies [21] where the upper limit was as high as 52 years which was attributed to assisted conception techniques that are now offered to increase the chances for perimenopausal women. Our lower value of the upper age limit for HSG might be because we are yet to commence assisted conception methods. The mean and modal ages for HSG was similar to other studies [11,16,17] which clearly suggest that the most common age at which women are made to come for HSG for the purposes of infertility is 30-34 years. This has been explained to be because this is the period of peak female reproduction for most women [11], and so if pregnancy does not occur at this period it becomes a source of worry for such women to seek medical help.

In our study, secondary infertility (92%) was much more prevalent than primary infertility (8%). This is similar to other studies [11, 17, 19, 20]. Some studies however, found that primary infertility was more prevalent than secondary infertility [18, 21]. The findings in these later studies was surprising even to the investigators where in one of the studies[18], there were unexpected findings of cervical and uterine synechiae in women who claimed primary infertility and had denied previous premarital termination of pregnancy. This denial of previous pregnancy was explained to be probably due to fear of marital disharmony.

Most indications for HSG were for tubal factor infertility and only 11(5%) were for uterine fibroid, cervical and uterine synechiae. This was much lower than previous studies where values higher than 17% were obtained [11,21]. Normal HSG tubal findings with contrast spillage present were found in 128 (53.6%) patients while 111(46.4%) had one or more tubal pathologies. The prevalence of pathological findings was similar to a study done in Port Harcourt [11] and is comparable to other studies [18,20]. These findings are however much lower than findings of older studies, for example, the World Health Organization in 1976 reported that tubal occlusion and acquired tubal anomalies accounted for 85% of infertility in Africa [22]. Stewart-Smythe et al in an article on lessons learned from the public sector in Uganda, also documented tubal pathology in 82.5% of 206 women studied [12,23]. This may be explained to be due to poorer health seeking behaviour of patients in those older studies and the current use of antibiotics preventing infectious diseases from damaging tubes recently.

Bilateral tubal occlusion was seen in 15.5%. This is similar to a study done by Broeze et al [24] where a meta-analysis of seven studies on the hysterosalpingography diagnosis of tubal pathologies revealed that the overall prevalence of bilateral tubal pathology was 15% with a range across studies from 9 to 21%. This is however much higher than the 4% previously reported in Port Harcourt [25] and the 4.5% reported in Sokoto.[17] Tubal obstruction in our study was much higher on the left (5.9%) than on the right (3.3%). Similar results were obtained in a study in Lagos [12] These findings were however at variance with other studies [11,18]where tubal obstruction was more on the right and where this was explained to be due to previous appendectomy and its surgical complications [11]. We may not completely explain these differences but the use of antibiotics and prompt treatment of infections that are usually found in the study area may have prevented this from being the case in this study and others with similar findings.

Hydrosalpinx was seen in 21.7% of the cases. Similar findings were reported by Bello [20] in Ilorin and Okonofua [26] in Benin City where values of 20% and 23.3% were obtained respectively. These findings were however higher than previous studies where the incidence of hydrosalpinx ranged from 6.4 to 11% [11,21,27]. Hydrosalpinx was noted to be more common on the right (10.9%) followed by 9.1% on the left with bilateral hydrosalpinx accounting for only 1.7%. Some researchers have suggested that the presence of the appendix on the right side may predispose to increased PID on the right side with resultant hydrosalpinx [20]. Majority of these cases also showed the presence of contrast material spillage unlike previous studies [11] where majority of cases showed no contrast spillage. This can also be explained to be due to earlier commencement of antibiotics where damage to the tube to cause hydrosalpinx must have occurred but not enough to cause distal tubal occlusion.

IV. Conclusion

The incidence of tubal occlusion and hydrosalpinx was high in patients presenting with infertility in this study. However, majority of cases of infertility had normal Salpingograms with bilateral tubal patency.

Conflicts of interest

The authors declare no conflicts of interest.

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