

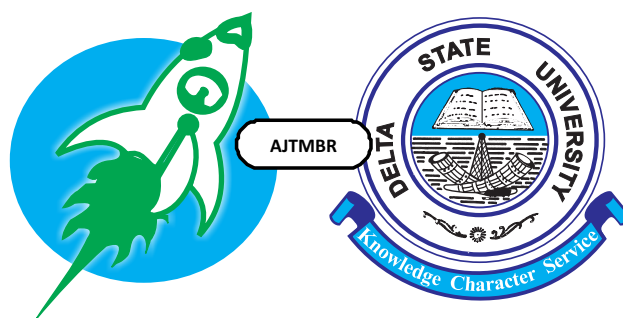
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Tubal Factor Infertility: Hysterosalpingography and Laparoscopic Evaluation in Ilorin, Nigeria.

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ABSTRACT

Objectives: To compare diagnostic accuracy of laparoscopy and HSG in the evaluation of tubal patency among infertile women.

Materials and Methods: A cross-sectional prospective study of infertile women who underwent HSG and laparoscopy for tubal patency between 1st January 2011 and 31st December 2015.

Results: Ninety-seven (97) eligible patients were included in the study. The patients were aged 21-50 years with a mean age of 33 ± 6.6 years. Majority (79.4%) were nulliparous. Most (63.9%) belong to middle social class. Fifty (51.5%) had primary infertility while (48.5%) had secondary infertility. Their duration of infertility ranges from 1-33 years (5.6 ± 5.5). HSG revealed bilateral tubal blockade in 23 (23.7%), bilateral patent tubes in 38 (39.2%) and unilateral patent tube in 36 (37.1%) while laparoscopy showed bilateral tubal blockade in 18 (18.6%), bilateral patent tubes in 51 (52.6%) and unilateral patent tube in 28 (28.8%) respectively. There was significant difference between HSG and laparoscopic findings on tubal status determination ($p < 0.05$). Laparoscopy revealed other tubal and non-tubal pelvic findings not evident on HSG. The sensitivity of HSG was 100%, specificity was 93.7%, and the positive predictive value was 78.3%, with a negative predictive value of 100%.

Conclusion: HSG and laparoscopy are of diagnostic importance in the evaluation of tubal status; however, laparoscopy is superior most especially in the detection of other tubal and non tubal pathologies which could be responsible for infertility; thus both tests are complimentary.

Keywords: Laparoscopy, Hysterosalpingography, Tubal patency, Ilorin

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INTRODUCTION

Infertility and childlessness remain one of the most common and underappreciated reproductive health problems in developing countries.¹ The inability to procreate is frequently considered a personal tragedy and can result in marital instability and suicidal tendencies.¹ It is one of the most common disorders confronting gynecologists and is defined as the inability to conceive after one year of regular unprotected intercourse.^{1, 2} The prevalence of infertility has increased in the last decade due to increase in sexually transmitted diseases most especially in the third world

countries and an increased tendency to delay child bearing.²

Tuboperitoneal factors are responsible for about 30-40% of female infertility and hence evaluation of tubal patency represents a key step and a basic investigation in the assessment of infertile women. Tubal occlusion is the most common underlying cause of infertility and the incidence varies from country to country.^{1,3} Several studies have reported rates of between 5 – 15% in developed countries. However, in tropical Africa, infertility rates are between 10%-20%, although prevalence rates of up to 30% and even 50% have

been reported in the Congo.^{1, 4}

It has been estimated that PID – related tubal adhesions, causes 30 – 50 % of all cases of female infertility worldwide.⁴ In Africa, this is usually due to *Neisseria gonorrhea* and ranges from 42 to 77% in the literature.⁴ Even with treatment, bilateral tubal occlusion was noted in 20% of cases in one series done in Kenya.⁴

Ever since Rubin described the tubal insufflations test in 1920 by using CO₂, numerous methods have been developed for evaluation of tubal status. Hysterosalpingography (HSG) and laparoscopic chromoper-tubation are widely employed.⁵

Although both HSG and laparoscopy are invasive techniques, HSG is much less invasive than laparoscopy. Furthermore, HSG being a relatively inexpensive, simple and rapid diagnostic test continues to be the first line approach in assessing tubal patency.²

Laparoscopy and dye insufflations is recommended by the Royal College of Obstetricians and Gynecologists as the tubal patency investigation of choice for infertility.⁶ This study compares diagnostic accuracy of hysterosalpingography and laparoscopy on tubal factor infertility at the University of Ilorin Teaching Hospital to assess their diagnostic accuracy.

Materials and methods:

This is a cross- sectional prospective study of 97 patients with infertility who were managed at the Assisted Reproductive Technology Unit of University of Ilorin Teaching Hospital, Ilorin between 1st January 2011 and 31st December 2015. All patients had complete hormonal profile (LH, FSH, E2, P2, Prolactin and Testosterone) and abdomino-pelvic/ Transvaginal ultrasound for their infertility work up and any abnormalities was corrected. Informed consent was routinely obtained from our patients prior to any procedure and possibility of conducting a research on their findings. Patients' case notes were reviewed alongside information extracted from ward registers and theater records. Information obtained included age; duration and type of infertility along with findings on HSG and

laparoscopy were documented.

HSG was usually performed prior to ovulation between menstrual cycle days 7 and 12 to avoid potential pregnancy and to take advantage of thinner proliferative phase endometrium. Patient was placed in dorsal lithotomy position and following vulval cleaning, a tenaculum was used to grasp the anterior lip of the cervix. A Leech-Wilkinson cannula was introduced through the cervical os and water-soluble radio opaque contrast dye injected into the uterine cavity. Serial X-ray films were taken during the procedure; before cannulation (the preliminary film), during the filling phase of uterine cavity by contrast material, and as the dye leaks out and spread in the pelvic cavity – usually after about 30 minutes of contrast instillation (delayed film).

Laparoscopy was performed 6 months following HSG if no evidence of pregnancy. Patients were evaluated and confirmed fit for surgery. Complete blood count, urinalysis, electrolyte, urea and creatinine estimation were requested pre-operatively. Patients also had bowel preparation with Dulcolax and enema saponis. All procedures were performed under general anesthesia.

In positioning of patients for the procedure, both the modified Trendelenburg and Lloyd-Davis positions were used according to preference of the surgeon. The anterior abdominal wall was lifted between gauze pads and a Veress needle was passed at the sub-umbilical region.

Pneumoperitoneum was created with carbon dioxide insufflation using an electronic insufflator at 4-6l/min and preset pressure of 12-15 mmHg. Next, the Veress needle was removed, the incision extended to 10cm and a 10mm trocar and cannula were passed through the incision. The trocar was then removed, and the laparoscope inserted into the peritoneum through the primary port and panoramic evaluation of the abdominal cavity was undertaken by rotating camera through 360 degrees to rule out any adherence of bowel and decision made depending on the procedure for inserting secondary ports through small incisions under direct vision with attention to the deep inferior epigastric vessels using base-ball diamond concept. Tubal patency was then confirmed by instilling diluted methylene blue dye

through a Leech-Wilkinson cannula at the cervix and looking out for spillage of the dye through the fimbrial ends of the tubes. Other tubal and non-tubal pelvic abnormalities were operated upon by the surgeon e.g. adhesiolysis, ovarian cystectomy, laparoscopic ovarian drilling and myomectomy. After the procedures, the peritoneal cavity was lavaged with warm saline and suctioned out. Instruments and laparoscope were removed under direct vision. Patients were usually discharged within 24 hours of procedure.

Data was collected using a proforma designed for that purpose and descriptive statistical analysis was carried using a commercial statistical package (SPSS/PC version 16.0, SPSS Inc., Chicago, III, USA). A p-value of < 0.05 was considered as statistically significant. The sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of HSG were calculated with 95% confidence

interval.

Results

The study included ninety-seven patients evaluated for infertility that had HSG and laparoscopy in their work up. The mean age of the patients was 33 ± 6.6 years (Range: 21 to 50 years). Majority (79.4%) was nulliparous and their duration of infertility ranges from 1 to 13 years (5.6 ± 5.5). Sixty-two (63.9%) belong to middle social class. Fifty (51.5%) had primary infertility while (48.5%) had secondary infertility (Table 1). Table 2 shows the tubal patency status of patients by both hysterosalpingography and laparoscopy. HSG revealed bilateral tubal blockade in 23 (23.7%), bilateral patent tubes in 38 (39.2%) and unilateral patent tube in 36 (37.1%) while laparoscopy showed bilateral tubal blockade in 18 (18.6%), bilateral patent tubes in 51 (52.6%) and unilateral patent tube in 28 (28.8%) respectively.

Table 1: Socio-demographic variables

N=97

Variables	Frequency	Percentage(%)
Age of Wife (years)		
20-29	31	31.9
30-39	49	50.5
40-49	15	15.5
50-59	2	2.1
	Range = 21-50	Mean= 33 ± 6.6
Parity		
0	77	79.4
1	19	19.6
2	1	1.0
Social Class		
Upper	19	19.6
Middle	62	63.9
Lower	16	16.5
Type of Infertility		
Primary	50	51.5
Secondary	47	48.5
Duration of Infertility		
1-10	86	88.7
11-20	9	9.2
21-30	2	2.1
	Range = 1-33 years	Mean= 5.6 ± 5.5

Table 2: Tubal patency status on Hysterosalpingogram and laparoscopy

Variables	Frequency	Percentage (%)
HSG		
Bilateral Blocked tube	23	23.7
Bilateral patent tube	38	39.2
Unilateral patent tube	36	37.1
Laparoscopy		
Bilateral Blocked tube	18	18.6
Bilateral patent tube	51	52.6
Unilateral patent tube	28	28.8

Table 3: Comparing diagnostic accuracy of Laparoscopy and HSG

HSG	LAPAROSCOPY		
	Blocked	Patent	Total
Blocked tubes	18	5	23
Patent tubes	0	74	74
Total	18	79	97
	$\chi^2 = 76.02$	df=2	p=0.000

*Sensitivity = 100%, Specificity= 93.7%, Positive Predictive value (PPV) = 78.3%
Negative Predictive value (NPV) = 100%*

Table 4: Tubal and non-tubal laparoscopic pelvic findings

Diagnosis	Number of cases	Percentage (%)
Normal	10	10.3
Tubal Blockage	18	18.6
PCOS	25	25.8
Ovarian cyst	10	10.3
Endometriotic cyst	10	10.3
Uterine Fibroid	13	13.4
Peritubal/ovarian adhesion	11	11.3

Table 3 shows the performance of HSG in the diagnosis of tubal patency compared to laparoscopy. There was significant difference between HSG and laparoscopic findings on tubal status determination ($p < 0.05$). The sensitivity of HSG was 100%, specificity was 93.7%, and the positive predictive value was 78.3%, with a negative predictive value of 100%. Laparoscopy revealed other tubal and non-tubal

abnormalities not evident on HSG. This included Polycystic ovaries 25 (25.8%), uterine fibroid 13 (13.4%), peritubal and periovarian adhesion 11 (11.3%) and bilateral tubal blockade 18 (18.6%) (Table 4).

Discussion

Exploration of the female genital tract is one of the essential elements of infertility assessment.

Mechanical factors account for approximately 30% of infertility in women, and various methods such as transvaginal ultrasonography, hysterosalpingography (HSG), hysteroscopy and laparoscopy have been used to determine the underlying factors.^{7,8}

Laparoscopy is the best technique for diagnosing tubal and peritoneal disease and provides both a panoramic view of the pelvic reproductive anatomy and a magnified view of pelvic organs and peritoneal surfaces and permits detection of uterine fibroids, peritubal and periovarian adhesions, and pelvic endometriosis.⁵ Laparoscopy also allows careful assessment of the external architecture of the tubes and in particular the visualization of the fimbria.⁷ It is generally accepted that, diagnostic laparoscopy is the gold standard in diagnosing tubal pathology and other intra-abdominal causes of infertility even though, it has the disadvantage of being an invasive procedure associated with morbidity and mortality.^{5,7,8}

Hysterosalpingography, on the other hand, is a frequently utilized diagnostic method in the assessment of tubal status and detection of intra uterine anatomical defects in infertility diagnostic workup. However, the inadequacy of HSG in determining the state of tubal patency, emphasizes the need for laparoscopy.⁹

The mean age of the patients in this study was 33 ± 6.6 years (range: 21 to 50 years) which is higher than findings from a similar study by Mol et al,¹⁰. This may be related to poor orthodox health seeking behaviors among infertile couples most especially assisted conception centers in our environment coupled with delayed marriage primarily due to pursuance of academic carriers. Also, most of the patients (63.9%) belong to middle social class as against majority of subjects in lower social class in a previous study by Seal et al,⁵ this is because the present study was conducted in a dedicated fertility research institute with facility for assisted reproduction technology as such financial accessibility is restrictive though the centre has provision for few indigent patients for their fertility treatment. This study compared HSG and laparoscopy in the diagnosis of tubal factor infertility. HSG is

the initial investigation to assess the patency of the fallopian tubes. This is because it is less invasive and more cost effective. However, pain is the most common complaint that patients gave after returning from an HSG session.² Other likely complications include allergic reactions to contrast, pelvic infections, endometriosis, tubal rupture (due to contrast material given under pressure in patients with hydrosalpinx) and radiation exposure. Therefore, known hydrosalpinx, acute PID or cervicitis, and adnexal mass palpable on bimanual examination all constitute contraindications to HSG.^{2,5}

The study showed that HSG though with high sensitivity (100%) and negative predictive value (100%), has lower specificity (93.7%) and positive predictive value of 78.3% resulting in false positive results. The false positive result could be explained by the fact that spasm of uterine/tubal musculature (due to pain mentioned earlier) during HSG may cause non-demonstration of one or both fallopian tubes. Buscopan is known to be effective in relieving tubal spasm as demonstrated by Akintomide et al¹² who observed tubal patency after it administration in nine cases that previously showed occlusion.^{11,12} Glucagon is another agent used for this purpose.¹³ However; this is not practiced in our centre. Tubal spasm does not occur in laparoscopy because it is performed under general anaesthesia with good relaxation of pelvic organs.

Findings from this study also showed that 60.8% of the patients were found to have tubal blockage by HSG which is higher than the 47.4% recorded for laparoscopy. This is however different from result of Okonofua et al⁸ who studied 48 patients with HSG, laparoscopy and laparotomy, the latter taken as the reference. In HSG, 5 patients had normal tubes and 43 patients abnormal tubes. For laparoscopy, these numbers were 3 and 45, and for laparotomy 2 and 46 even though, the authors did not calculate sensitivity and specificity for their study.⁸ Mol and colleagues assessed 794 infertile women in whom both HSG and laparoscopy was performed. They found sensitivity and specificity values for HSG to be 81% and 75% respectively.¹⁰

When comparing HSG and laparoscopy, we

should keep in mind that both procedures provide more information than the condition of the Fallopian tubes alone. Whereas HSG provides information on the status of the intrauterine cavity, laparoscopy allows detection of other tubal, non-tubal and intra-abdominal lesions that could impact on fertility as demonstrated by the detection of uterine fibroids, endometriotic cyst, ovarian cyst, Polycystic ovaries and peritubal and periovarian adhesions which were resolved in the present study.¹⁴

Conclusion:

Both HSG and laparoscopy are of diagnostic importance in the evaluation of tubal patency in the management of both primary and secondary infertility. However, HSG should be a first line modality due to its being less invasive, lower cost and fewer complications. Laparoscopy being more superior most especially in the detection of other tubal and non-tubal pathologies should be reserved for cases of bilateral tubal occlusion following HSG before proceeding to the extreme of offering IVF to such couples.

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