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Original Article

A Prospective Study on Hysterosalphingography and Laproscopic Chromopertubation In Evaluation of Tubal Factors of Infertility In Tertiary Care Hospital –Tirupati

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Abstract

Background: Tubal occlusion is one of the most common cause of infertility in females. Hence evaluation of tubal factors is essential for management plan of infertility. The two most important diagnostic procedures used for evaluation of tubal patency are Hysterosalphingography (HSG) and Laproscopy.

Objectives: (1) To study the uterine and tubal findings of Hysterosalpingography in infertile women. (2) To study the findings on diagnostic laparoscopy and patency of tubes by laparoscopic chromopertubation in infertile women. (3) To compare Hysterosalpingography with Laparoscopic findings in diagnosis of tubal patency in infertile women.

Methods: A hospital based prospective study was conducted on fifty infertile women attending Gynec outpatient clinic over a period of one year from 2020 -2021.Hysterosalphingography was done within 10 days of last menstrual period on outpatient procedure. If tubal block was present, laproscopy was conducted in same or next cycle. If the tubes were patent on HSG, Laproscopy was done after three cycles if pregnancy did not occur. The findings of HSG and Laproscopy were then compared.

Results: Taking Laparoscopy as gold standard, the present study evaluated HSG as a test for tubal factor of infertility. We found sensitivity of 100%, specificity of 93.6 %, with positive predictive value 50 % and negative predictive value 0f 100 %, diagnostic accuracy of 94 % with p value <0.001.

Conclusion: HSG is considered to have a high sensitivity and specificity. HSG and laparoscopy are not alternative, but are the complementary to each other in evaluation of tubal factors in infertile women. HSG had the added advantage of evaluating the uterine factor, whereas laparoscopy is good at evaluating the peritoneal and peritubal pathology.

Key words: Hysterosalphingography, Laproscopy, Tubal patency, Infertility

INTRODUCTION

80% to 90% of couples achieve conception within one year of having regular intercourse[1]. 95% conceive by the end of 2nd year[1]. Others remain infertile by end of 2nd year. At present, 8-10% couples are infertile world wide[2]. India contributes to 25% of total infertility cases worldwide.[3] Prevalence of infertility differs one state to other in India, it is 3.7% in Himachal Pradesh, Uttar Pradesh and Maharashtra[4], 5% in Andhra Pradesh, and 15% in Kashmir. Prevalence of infertility varies in same region across tribes and caste[5].

"Infertility is defined as inability to conceive even after one year of unprotected regular intercourse"[6]. Infertility is of two types primary and secondary. Primary infertility is defined as no pregnancy in the past[7]. Secondary infertility is defined as

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history of pregnancy in past irrespective of number and type and outcome[7]. "Prevalence of primary infertility in India is between 3.9 to 16.8%as per WHO estimates"[8]

Male factors contributed to 20% of infertility cases[9]. Female factors contribute to 40% to 55% of infertility cases[9]. In 10% both are accountable, other 10% are unexplained[9]. In females tubal factors contribute to 25%- 35%[10], Ovulatory dysfunction in 30% - 40%, Uterine factors in 15%[11], Cervical in5%, and Pelvic endometriosis in 6 to 10%[12].

Main cause for tubal infertility is sexually transmitted diseases most often by Chlamydia and gonococcus causing pelvic inflammatory disease, other causes being mucosal plugs in fallopian tubes, peritubal adhesions, tubo ovarian mass, hydrosalpinx, tubal endometriosis.

Infertility in present times has become a major problem confronting gynaecologists. At present times females have become more career oriented and they are getting lately married, infertility has become a common problem causing concern to the couple. As a result, infertility and its treatment has caused a serious strain on their interpersonal relationship, and also disturbed relationships with other people[13]

Tubal blockage is one of the most frequent causes of infertility in women. The degree of tubal pathology determines the possibility for fertility. The evaluation of the fallopian tube is necessary to determine the management plan of infertility. A number of diagnostic tests are being used in clinical practice to assess tubal patency as part of the work-up for infertility.

The degree of tubal pathology determines the possibility for fertility. The evaluation of the fallopian tube is necessary to determine the management plan of infertility. A number of diagnostic tests are being used in clinical practice to assess tubal patency as part of workup for subfertility.

The most commonly used tests are hysterosalpingography (HSG) and laparoscopy. The HSG is a contrast enhanced fluoroscopic and flat plate study used to evaluate the endometrial cavity and fallopian tubes. It has been a test in the workup of infertile couples as a minimally invasive method of evaluating tubal patency and is performed as the first line approach for assessing tubal pathology[14]. Whereas laparoscopy is considered the clinical reference test for diagnosing tubal pathology. Laparoscopy allows visualization of peri-adnexal adhesions and the presence of endometriosis, which cannot be done with HSG[14].

Hysterosalpingography and diagnostic laparoscopic chromopertubation were complementary to each other because HSG studies the intraluminal pathology whereas laparoscopy offers diagnosis of peritubal and peritoneal pathology. There are not many studies in our population comparing these two modalitiies. So, this study aims to compare and correlate the HSG and Laparoscopy findings.

MATERIALS AND METHODS

A hospital based prospective study was conducted at Government Maternity hospital, Tirupati after obtaining approval from institutional Ethics Committee. The study was conducted in time period 2020-2021. 50 infertile patients both primary and secondary, attending the outpatient clinic in Government Maternity Hospital, Tirupati were selected for the study.

Inclusion Criteria

1. Women with primary or secondary infertility.
2. Age between 20 to 35 years.
3. Normal bimanual pelvic examination

Exclusion Criteria

1. Active Pelvic inflammatory disease.
2. Active Cervical or Vaginal infection.
3. Other medical or surgical disorders.
4. Suspected Genital Tuberculosis.
5. Any medical conditions that preclude laparoscopy.
6. Husband with azoospermia.
7. Active Abnormal uterine bleeding.

METHODS

- Both primary and secondary infertile cases attending the outpatient clinic in Government Maternity Hospital, Tirupati were selected for the study.
- Infertile couple were first counselled, and informed consent was taken for the study.
- Thorough history of both partners was taken followed by general examination and bimanual pelvic examination of the woman. Basic investigations like Haemoglobin, Serological tests, Semen analysis, urine analysis, thyroid profile were done. Transvaginal ultrasound was done on day3 and day 5. After initial evaluation of the couple Hysterosalpingography was done within 10 days of Last menstrual period as an outpatient procedure. If there was any infection it was treated and then Hysterosalpingography done. Patient was given two tablets of misoprostol, to be taken orally at night before the procedure. This procedure was done in X –Ray room in maternity hospital in OBG Department, Tirupati. Prior to procedure the bladder was emptied, injection Hyoscine given intramuscularly on deltoid and patient placed in dorsal

Table 1: Sociodemographic factorsfor infertility in female (Tubal factors)

1) Age (yrs)	No of Patients	Percentage (%)
20-25	9	18
25-30	26	52
30-35	15	30
Total	50	100
2) SocioEconomic Status	**No of Patients**	**Percentage(%)**
Upper Middle Class	1	2
Lower Middle Class	31	62
Upper Lower Clas	18	36
Total	50	100
3) Area Distrubution	**No of Patients**	**Total**
Rural`	13	26
Urban	37	74
Total	50	100
4) Educational Status	**No of Patients**	**Percentage(%)**
ILLITERATE	4	8
Schooling	16	32
Inter and Above	30	60
Total	50	100
5) Duration of Infertility	**No of Patients**	**Percentage(%)**
1-5	29	58
6-10	18	36
>10	03	6
Total	50	100
6) Type of Infertility	**No of Patients**	**Percentage(%)**
Primary	41	82
Secondary	09	18
Total	50	100
7) Comorbidities	**No of Patients**	**Percentage(%)**
Obesity	05	10
Hypothyrodism	09	18
Nil	36	72
Total	50	100

Table 2: Tubal findings and patency on HSG

Tubal Findings	No of Patients	Percentage(%)
Normal (B/L Patent)	44	88
B/L Cornual Block	03	06
Left Cornual Block	02	04
B/L Infundibular Block	01	02
Total	50	100

Table 3: Utrerine findings on HSG

Uterine Findings	No Of Patients	Percentage (%)
Normal	49	98
Arcuate	1	2
Total	50	100

Table 4: Uterine and ovarian findings on laproscopy

Findings	No of Patients	Percentage(%)
Normal Uterus	33	66
PCOS	16	32
Para Ovaria Cist	01	02
Total	50	100

Table 5: Tubal findings on laproscopy

Tubal Findings	No of Patients	Percentage(%)
Normal	48	96
B/L Hydrosalphinx	01	02
Tubal Adhesion	01	02
Total	50	100

Table 6: Tubal patency findings on laproscopy chromopertubation

Tubal Findings	No of Patients	Percentage(%)
B/L Patent	46	92
B/L Not Patent	03	06
B/L Patent Left Slow Patent	01	02
Total	50	100

Table 7: Correlation of patency of fallopian tubes in HSG & laproscopic chromo tubation

	Chromopertubation		Total	P-Value
	Not Patent	Patent		
HSG Tubes				
Not Patent	03	03	06	0.001
Patent	00	44	44	
Total	03	47	50	

position. Internal examination done, posterior vaginal wall retracted with speculum, cervix was visualized and anterior lip was held with allis forceps, Uterocervical length was measured. Hysterosalpingographic cannula fitted with syringe containing radio opaque dye urograffin 5 ml dye diluted with 5 ml of distilled water was introduced; speculum and allis forceps were removed and two radiographic views are taken, first one shows filling of uterine cavity and second one at completion of procedure showing tubal findings which was evidenced by peritoneal spillage.

Later in the same cycle or next cycle laparoscopy was done if there was tubal block on Hysterosalpingography. If patient showed patent tubes on Hysterosalpingography diagnostic laparoscopy with chromopertubation was done after three cycles of menstruation if the woman did not conceive. Patient was admitted a day before surgery and preoperative preparation was done. Laparoscopy was done under general anesthesia. A one cm incision was made within or just below the lower edge of the umbilicus. Through this incision the abdominal cavity was inflated with carbon dioxide gas and pneumoperitoneum being obtained. A trocar was inserted in the same region. The cannula of the trocar was left,

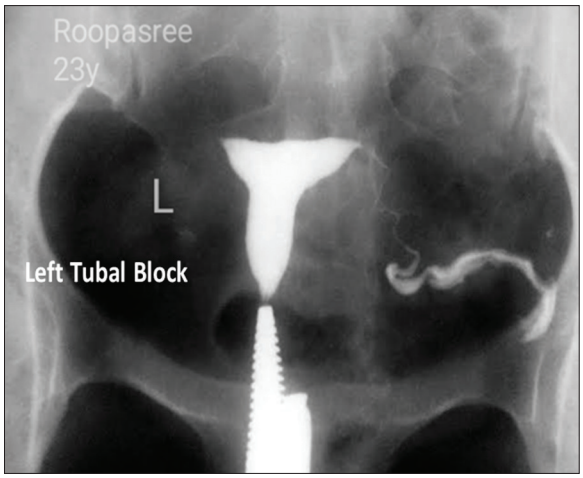

Image 1: Left tubal block on HSG

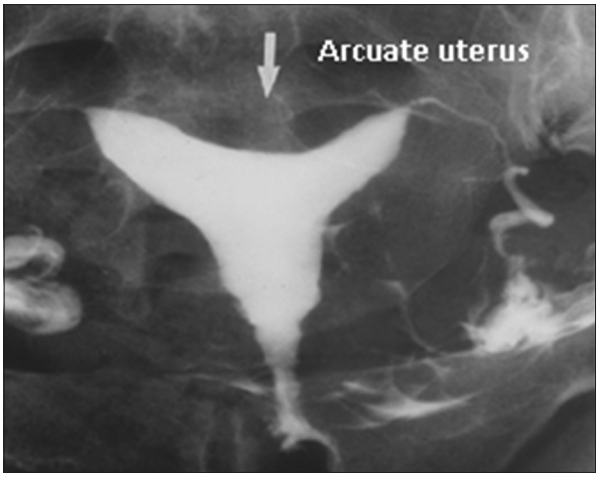

Image 2: Arcuate uterus on HSG

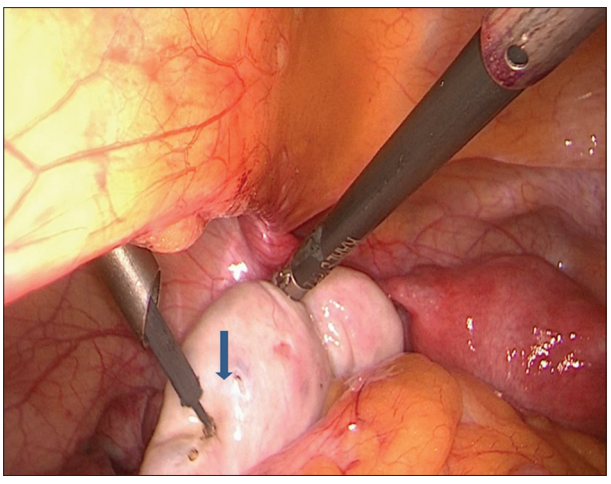

Image 3: Ovarian drilling for PCOS

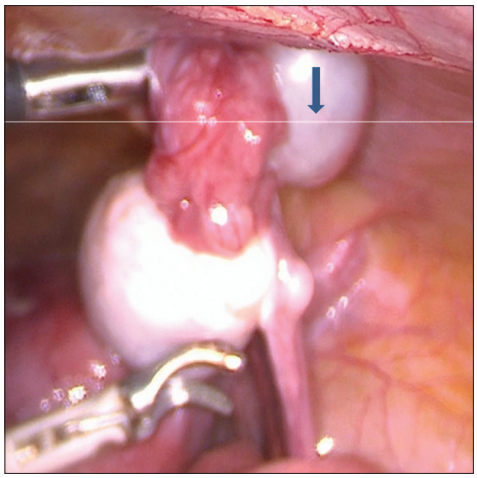

Image 4: Paraovarian cyst on laparoscopy

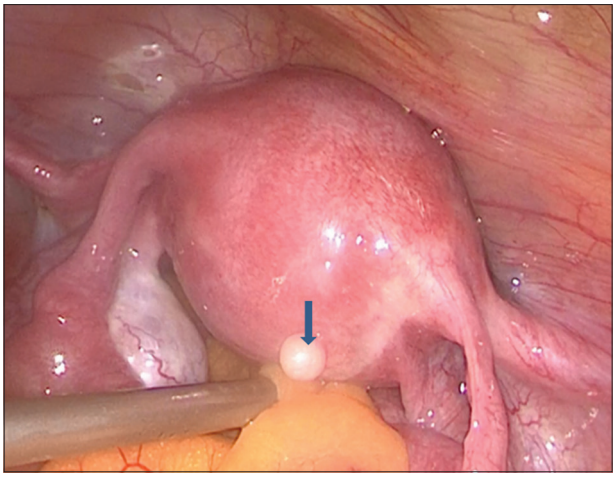

Image 5: Subserosal fibroid on laparoscopy

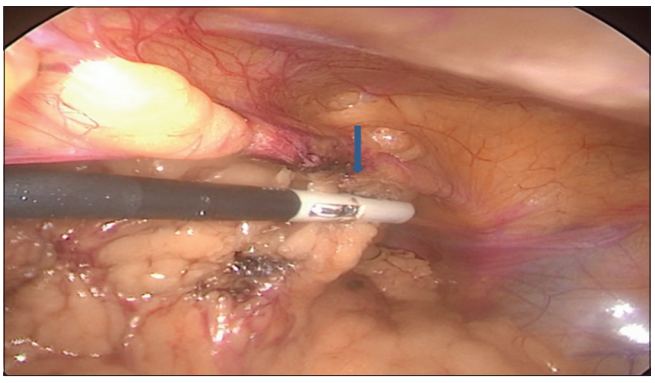

Image 6: Adhesiolysis

and the trocar was pulled out. Then a laparoscope was introduced through the cannula. The abdominal cavity and pelvic structures i.e uterus, tubes, ovaries and pouch of douglas were examined. Then by leech wilkinson cannula diluted methylene blue dye was injected into the cervix. Chromopertubation done, spill visualized in the peritoneal cavity and findings noted. The site of block, peritubal adhesions, hydrosalpinx and other pathology if any was noted. If there was Polycystic ovarian disease, ovarian drilling was done. Adhesions if present were released in same setting. Laparoscope was withdrawn after completion

of procedure. Patient was shifted to recovery room and then post-operative ward after checking the vitals. Patient was allowed to take feeds after 6 hours later. Results of Hysterosalpingography and laparoscopy were noted down. Both the findings were compared. "Results and data were analysed using MS excel software, Epi SPSS22 Version. E"

RESULTS

44 (88%) women had patent tubes with peritoneal spill [Tables 1 and 2] , 03 (6%) had b/l cornual block, 02 (4%) had left cornual block, 01 (2%) had b/l infundibular block on HSG [Table 3 and Image 1].

One Patient had Arcuate uterus on HSG

All the women had normal uterine findings on [Image 2 and Table 4] laparoscopy,one patient had subserosal fibroid and 16 patients had polycystic ovaries [Images 3-5 and Table5].

One patient had Bilateral Hydrosalpinx and one patient had peritubal adhesions on laproscopy [Image 6 and Tables 6and 7] .

Three patients showed bilateral block in both Hysterosalpingography and Laparoscopy. Another three patients had block in Hysterosalpingography but the tubes were patent in Laparoscopy. HSG correlated well with diagnostic laparoscopy, with "p value of 0.001, sensitivity of 100% and specificity of 93.6%".

DISCUSSION

Infertility has become a major problem in modern era due to late marriages and women have become more career oriented. Tubal factors are an important causes of female infertility. A prospective study was carried out on 50 infertile women in Government Maternity hospital, Tirupati,a tertiary care hospital over a period of one year from 2020 -2021. Hysterosalphingography and Laproscopic chromopertubation was done in these women and findings were correlated.

Sociodemographic factors for female infertility (Tubal factors)

In the present study 26 ((52%) of the infertile women were in the 25-29 years age group. In a central Indian cross sectional study which was community basedand conducted in 2019 majority belonged to 25-29 years of age group[15]. This is similar to another study done in Mysore, India where the mean age of infertile patients was 25. 9 years[16]. 31 (62%) infertile women in the present study were from lower middle class, according to modified kuppuswamy classification[17]. But NHFS -2 showed a higher prevalence among women belonging to low socioeconomic status when compared to medium and high Socio economic status[18].

In the present study74% of infertile women were from urban area. This is similar to the study done among infertile patients in South India where most cases were from urban area[19]. However a study done in Alexandra, Uzbekistan showed infertile women from rural areas. Another study done in 2015 in Punjab showed infertile women from rural areas[20]. This could be owing to infertile women's varying levels of awareness.

In the present study, 60 % of infertile women were well educated. A South Indian study carried out on risk factors of infertility showed that women with secondary school education and above had high prevalence of infertility[19]. A US study compared areas by number of colleges present, and identified that female graduates from college have 20% fewer children, on average, than high-school graduates.[21]

In the present study about 58% women had 1-5 years of infertility duration. This is similar to the study done in Nigeria in 2004 and 2015 with mean duration of infertility of 4.48 years[22]. One South Indian Research done in Bangalore had mean duration of infertility of 5. 9 years[23]. These studies showed that most of the women took treatment for infertility within 4-5 years of marital life.

In the present study, 41(82 %) of the infertile women had primary infertility, 9 (18%) had secondary infertility. This is similar to a 2005 study in Thailand, in which 72.03%women presented with primary infertility[24]. In a study done in Maharastra in 2018 majority of women presented with primary infertility.[25]

In the present study, 18% had Hypothyroidism and 10% were obese. This is similar to the study in Punjab where 23.9% infertile women were hypothyroid[26].A study conducted in Bangalore, India showed that 8.3% of infertile women were Obese 26.7% of women were over weight and 55% women had normal body weight which is similar to the present study[27].

In the present study, 44(88%) infertile women had B/L patent fallopian tubes,three patients(6%) had Bilateral cornual block, two patients (4%) had left cornual block, one patient (2%) had infundibular block in HSG. In a Saudi Arabian study 15% of women had bilateral tubal block and 20% with unilateral tubal block on HSG[28]. In a study conducted in Dehradun, India 39% had bilateral tubal block, 4% with unilateral tubal block on HSG[29]. In a study done in Maharashtra 7% had bilateral tubal block and 8 percent had unilateral tubal block present in HSG[30].

In present study, proximal tubal obstruction wass seen near cornual end and in one case infundibular block was noted in contrast to Nigerian study where distal obstruction was

most common[31]. In a study conducted at Ambala,Haryana proximal tubal obstruction was most common which is similar to present study. This may be due to cornual spasm inspite of giving Inj.Hyoscine.

Uterine and Ovarian findings on Laparoscopy

In the present study Laproscopy showed normal uterine findings, 32% of infertile women showed Polycystic ovarian syndrome on diagnostic laparoscopy where ovarian drilling was done on same setting and one patient had left paraovarian cyst where cystectomy was done. This is similar to the study done in Bangalore where the incidence of polycystic ovarian disease in primary infertile women is 25.7% and 13.3 % in secondary infertile women[23]. In a study conducted in Haryana, India 23% ovarian factors were detected in laparoscopy of which PCOS was the most common.

Tubal findings and Tubal patency on Laparoscopy

In the present study tubal findings were normal in almost all women except one who had peritubal adhesion and other woman had bilateral hydrosalpinx. 3 women had bilateral tubal block on Laproscopic chromopertubation. In contrast, a study in Austria, 39% had bilateral tubal occlusion in laparoscopic chromopertubation[32]. This may be due to difference in incidence of pelvic inflammatory disease and sample selection.

Correlation between HSG and Laparoscopy

In the present study, 12% women had abnormal tubal pathology in HSG. Of these 6% had bilateral tubal block in laparoscopic Chromopertubation while remaining 6% had patency in laparoscopic chromopertubation. In this study sensitivity of Hysterosalpingography was 100%, specificity of 93.6%, PPV was 50%, Negative Predictive Value was 100% and diagnostic accuracy of 94 percent with p value <0.001. In a study conducted on role of HSG and Laparoscopy in Madhya Pradesh, India, sensitivity and specificity of HSG was 93.3% and 91.1% respectively, with positive predictive value 77%, negative predictive value 97.61%[33]. In a research of 61 infertile patients conducted in Maharashtra, India, the sensitivity and specificity on HSG is 90 percent and 60 percent respectively, positive predictive value is 60 percent, and negative predictive value is 90 percent, which is similar to the current study[30]. In a study conducted in 420 patients in USA, it was said that HSG is as efficient as Laparoscopy in tubal factor evaluation[34].

CONCLUSION

HSG is a simple and cost effective diagnostic tool in evaluating tubal factors in female infertility. It has an added advantage of evaluating the uterine factor like uterine anomalies. Space occupying lesions and intrauterine adhesions.Laparoscopy is good at evaluating the pelvic pathology such as endometriosis, adhesions and ovarian cause of female inferlity in addition to tubal factors.

HSG and Laparoscopy are thus complementary to each other in evaluation of tubal factor of infertility".

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