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Original Research Article

Role of hysterosalpingography and diagnostic laparoscopy in infertility

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ABSTRACT

Background: Infertility is one of the commonest problems encountered in gynecology. Improved familiarity with and access to infertility services among the affluent and better educated patients probably accounts for their greater use of the medical resources. The two most important diagnostic procedures which are used for evaluation of infertility are hysterosalpingography (HSG) and laparoscopy.

Methods: The present study was conducted on 50 patients with infertility after meeting inclusion criteria in the Department of Obstetrics and Gynaecology and Department of Radio-diagnosis, in Maharishi Markandeshwar Institute of Medical Sciences and Research, Mullana, Ambala over a period of 18 months. All the patients were examined by HSG as part of their routine infertility evaluation, three months after HSG, status were assessed by laparoscopy. All the data collected were presented in terms of frequencies and percentage. Chi-square and p value were calculated in excel. P <0.05 was considered statistically significant.

Results: The study included 50 female patients with infertility. Among them 34 (68%) patients belonged to primary infertility and 16 (32%) belongs to secondary infertility. 58% of patients were in the age group between 20-25 years, 28% in between 26-30 and 14% with age above 30 years. Maximum number of cases 29 (58%) had duration of infertility between 1-5 years. Of the 50 patients, 31 cases had normal HSG findings and 19 cases had abnormal findings. 15 patients were dropped from the study during the period of laparoscopy. On laparoscopy 7 (20%) patients were observed with uterine abnormalities, 15 (43%) with tubal factors, 10 (29%) with ovarian defects, 7 (20%) with peritoneal factors and 4 (11%) with unknown etiology. On HSG and laparoscopy 7 patients had shown some complications.

Conclusions: Although laparoscopy is a superior method of detection of tubal and pelvic pathologies in the evaluation of infertility, HSG is more economical, highly sensitive and elementary method, suitable for evaluation of endometrial and tubal pathologies. These two methods are not alternative but are complimentary techniques.

Keywords: Infertility, Hysterosalpingography, Laparoscopy

INTRODUCTION

Around 15% of Indian population, both male and female is becoming infertile with no chance of becoming parents in the future.[1] Infertility is of two types. Primary infertility is defined as the incapacity to conceive within one year of exposure to pregnancy among women 15 to 49 years old with sexually active and non-contraception. Secondary infertility refers to the inability to conceive following a previous pregnancy.[2,3] Infertility investigation and its treatments are in great demand in present days. Fertility service centres have developed and expanded, together with the use of Assisted Reproductive Technologies (ART).[4,5] Tubal disease is one of frequent causes in about 25-35% of female infertility.[6] The degree of tubal pathology determines the possibility of fertility. A number of diagnostic tests are being available in clinical practice to evaluate tubal patency as part of the work-up for subfertility .[7]

Two main diagnostic tests to evaluate cause of infertility are hysterosalpingography (HSG) and laparoscopy. HSG

is the initial diagnostic test used to assess tubal patency because it has a sensitivity of 85 to 100% in identifying tubal occlusion.[2] It is performed between cycle days 7 and 10 in the postmenstrual phase at least 2-3 days after cessation of menstrual bleeding by using contrast fluoroscopic mediums (oil based and water soluble). Whereas laparoscopy is a single diagnostic investigation in infertility which gives the maximum information at the single procedure and can be done about one week postovulatory. Laparoscopy allows imaging of peri-adnexal adhesions and the presence of endometriosis, which cannot be viewed with HSG.[8]

The advantages of HSG seems to be detection of congenital uterine abnormalities whereas laparoscopy helps in identifying and correcting the pelvic abnormalities that causes infertility.[9] The findings of HSG was found to be more accurate and sensitive (60–98%) but with low specificity (15–80%) in detecting uterine abnormalities, but laparoscopy remains the method of choice for final assessment.[10] Hence, the present study was conducted to assess the role of HSG and diagnostic laparoscopy for the evaluation of infertile women.

METHODS

The present study was conducted on 50 patients with infertility in the Department of Obstetrics and Gynaecology and Department of Radio-diagnosis, in Maharishi Markandeshwar Institute of Medical Sciences and Research, Mullana, Ambala over a period of 18 months. Inclusion criteria were all infertile patients (primary and secondary) who were anxious to conceive and willing to undergo HSG and diagnostic laparoscopy for evaluating the same and excluding criteria were presence of azoospermia in the semen analysis of the husband, women who are unfit for general anaesthesia, H/O of allergy to urograffine for HSG, documented active genital TB, any active genital infection, suspected pregnancy, undiagnosed vaginal bleeding. Informed consent was taken from all the participants. A detailed patient's history was collected including duration of infertility, marital, coital and menstrual history, obstetric history in case of secondary infertility. General and systemic examinations were done in all patients. Routine investigations like estimation of Hb, bleeding time, clotting time, blood group, urea, creatinine, serum bilirubin, HIV, HBsAG, VDRL were done. Special investigations like semen analysis of husband were done in all infertile patients to exclude male factor. Laparoscopy was performed three month after HSG.[11] The HSG was performed by radiologist. The procedure was performed between days 6 and 12 of the menstrual cycle at least 48 hours after menses had ceased. HSG was performed using a sterile technique. The patients were placed in a lithotomy position, and a vaginal speculum was inserted. Rubin's cannula was placed and tip was placed just inside external cervical os while applying counter traction with tenaculum and speculum was removed. It was made certain that there was a right or left marker placed on the x-ray cassette. After obtaining scout x-ray, gentle traction was applied on cervix to bring uterus to horizontal position to x-ray tube. The contrast medium was injected in a slow, steady fashion under fluoroscopic guidance. Before injection, contrast medium was kept warm at body temperature to decrease tubal spasm. It was made sure that during injection there were no air bubbles in contrast medium. Early films were taken to record any intrauterine lesions and details of intratubal architecture, because such details were observed by large amounts of contrast material in the uterus, tubes and peritoneal cavity. First film was taken when endometrial cavity was filled with contrast. On injecting more contrast, fallopian tubes were visualized. Second x-ray film was taken to see uterine cavity and fallopian tubes. On further injection of contrast medium, peritoneal spill of contrast medium was determined and x-ray film was taken. Oblique skiagrams were taken to delineate the fallopian tubes clearly whenever required.

Laparoscopy was performed under general anaesthesia. The patients were placed in a lithotomy position combined with Trendelenburg position. Under anaesthesia, a pelvic examination was done to confirm the pelvic findings. A one cm incision was made within or just below the lower edge of the umbilicus. Through this incision the abdominal cavity is inflated with carbon dioxide gas and pneumoperitoneum being obtained. A trocar was inserted in the same region. The cannula of the trocar was left, and the trocar was pulled out. Then a laparoscope was introduced through the cannula. The abdominal cavity and pelvic were examined in the trendelenburg position. A traumatic grasper forceps were used by the assistance of a second trocar for better visualization. A third trocar was applied if required. To assess tubal patency, methylene blue was injected through another uterine manipulator and results of laparoscopy were recorded by the specialist. The skin incision was closed with a stitch. The patient was discharged after 2 to 3 days.

Statistical analysis

All the data were presented in terms of frequencies and percentages. P value was calculated by Chi-square test and the values less than 0.05 were considered statistically significant.

RESULTS

The study included 50 female patients with infertility. Among them 34 (68%) patients belonged to primary infertility and 16 (32%) belongs to secondary infertility. Table 1 presents the incidence of infertility related to socio-economic status and educational level of the patients participated in the study. Majority of the people involved belongs to upper lower class 22 (44%). In this study, majorly upto 38% cases are illiterates, 44% of cases had completed primary school education. Table 1:

Incidence of infertility related to socio-economic status and education of the participants.

Table 1: Incidence of infertility in relation to socio-economic status and education among patients.

Patients status	No. of patients (%)
Infertility	
Primary infertility	34 (68%)
Secondary infertility	16 (32%)
Socioeconomic status	
Upper	1 (2%)
Upper middle	3 (6%)
Lower middle	9 (18%)
Upper lower	22 (44%)
Lower	15 (30%)
Education level	
illiterate	19 (38%)
Primary school	22 (44%)
Middle school	5 (10%)
High school	3 (6%)
Graduate	1 (2%)
Total	50 (100%)

Table 2: Distribution of patients according to age and duration of infertility.

	Primary infertility No (%)	Secondary infertility No (%)	Total No (%)	Chi square and p value
Age (years)				
20-25	27 (79%)	2 (12.5%)	29 (58%)	χ^2 =27.74, P value =0.00
26-30	6 (17%)	8 (50%)	14 (28%)	
Above 30	1 (3%)	6 (37.5%)	7 (14%)	
Duration (years)				
1-5	24 (71%)	5 (31%)	29 (58%)	
6-10	9 (26%)	9 (56%)	18 (36%)	χ^2 =7.24, P value=0.027
11-15	1 (3%)	2 (13%)	3 (6%)	
Total	34 (100%)	16 (100%)	50 (100%)	

Distribution of patients according to age and duration of infertility were presented in Table 2. 58% of patients were in the age group between 20-25 years, 28% in between 26-30 and 14% with age above 30 years. Maximum number of cases 29 (58%) had duration of infertility between 1-5 years. 16 patients with secondary infertility was reported of having previous obstetric complications as given in Table 3. Maximum cases (50%) had spontaneous abortion.

Table 3: Previous obstetric outcome in secondary infertility.

Pre-obstetric outcome	No. of cases (%)
Spontaneous abortions	8 (50%)
MTP	1 (6%)
Previous ectopic pregnancy	2 (13%)
Previous normal delivery	3 (19%)
Previous IUD	1 (6%)
Previous preterm delivery	1 (6%)
Total	16

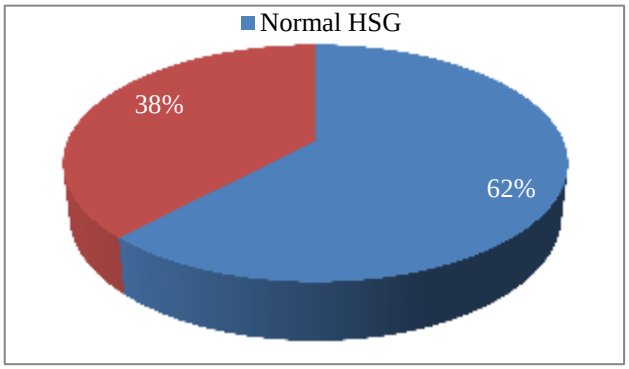

Figure 1: Number of cases with HSG findings.

Table 4: Incidence of tubal factors based on duration of infertility.

Duration of infertility (years)	No. of cases with blocked tubes in primary infertility	No. of cases with blocked tubes in secondary infertility	Chi square and p value
1-5	8	2	
6-10	1	5	χ^2 =6.56, P =0.03
11-15	1	2	
Total	10	9	

Table 5: Site of tubal obstruction on HSG.

Site of obstruction	Bilateral, No. (%)	Unilateral, No. (%)	Total No. (%)
Proximal tubal	7 (38%)	2 (11%)	9 (49%)
Mid segmental	-	4 (21%)	4 (21%)
Distal tubal	1 (4.5%)	4 (21%)	5 (25.5%)
Combined	1 (4.5%)	-	1 (4.5%)
Total	9 (47%)	10 (53%)	19 (100%)

Figure 1 presents cases with HSG findings. Of the 50 patients 31 cases had normal HSG findings and 19 cases had abnormal findings. Among 19 cases, 8 cases of primary infertility noted of having tubal blockage

belonged to group between 1-5 years and 5 cases with secondary infertility between 6-10 years as shown in Table 4. An obstruction in various tubal regions noted on HSG was presented in Table 5. Proximal tubal obstruction was seen in 9 (49%) of cases. Mid segmental obstruction in 4 (21%), distal tubal obstruction in 5 (25.5%) cases and combined tubal obstruction in 1 (4.5%) case.

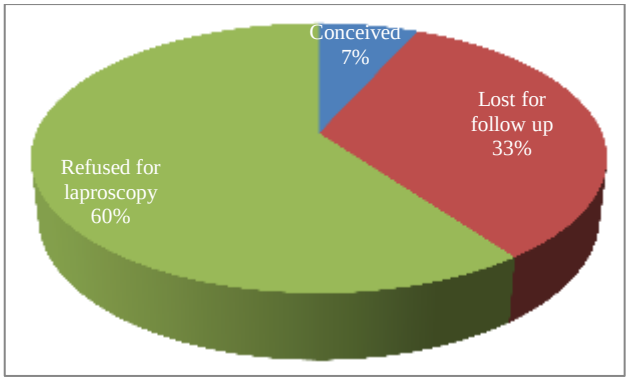

Figure 2: Percentage of cases refused for laparoscopy.

Table 6: Etiological factors examined in primary and secondary infertility cases on laparoscopy.

Causes of infertility	Primary, No = 24(%)	Secondary No =11(%)	Total No =35(%)	Chi square and p value
Uterine factors				
Hypoplastic uterus	3 (13%)	-	3 (8%)	χ^2 =7.00, p =0.03
Mullerian anomalies	2 (8%)	-	2 (6%)	
Fibroid uterus	-	2 (18%)	2 (6%)	
Tubal factors				
Bilateral tubal block	3 (12.5%)	-	3 (8.5%)	
Unilateral tubal block	-	2 (18%)	2 (6%)	
Peritubal adhesions	3 (12.5%)	-	3 (8.%%)	χ^2 =11.16, p =0.04
Hydrosalpinx	3 (12.5%)	1 (9%)	4 (11%)	
Tubal occlusion mass	-	1 (9%)	1 (3%)	
Delayed spillage or not perceived	2 (8.5%) (one each)	-	2 (6%)	
Ovarian factors				
PCOD	4 (17%)	1 (9%)	5 (14%)	
Streak ovaries	1 (4%)	-	1 (3%)	p =0.153
Ovarian cysts	1 (4%)	1 (9%)	2 (6%)	
Enlarged ovaries	1 (4%)	1 (9%)	2 (6%)	
Peritoneal factors				
Endometriosis	3 (13%)	-	3 (8%)	χ^2 =7.00, p =0.03
Pelvic adhesions	2 (8%)	-	2 (6%)	
Pelvic tuberculosis	-	2 (18%)	2 (6%)	
Unexplained	-	4 (36%)	4 (11%)	-

Table 7: Result of chromopertubation test on laparoscopy.

Result of chromopertubation test	Primary No = 24(%)	Secondary No = 11(%)	Total No = 35(%)	Chi square and p value
Bilateral positive	18 (75%)	4 (36%)	22 (63%)	
Bilateral negative	3 (13%)	1 (9%)	4 (11%)	
Bilateral positive	1 (4%)	6 (55%)	7 (20%)	χ^2 =12.35, P =0.01
Delayed spillage	1 (4%)	-	1 (3%)	
Not perceived	1 (4%)	-	1 (3%)	
Total	24 (100%)	11 (100%)	35 (100%)	

Table 8: Complications of HSG and laparoscopy.

Complications during HSG		Complications during laparoscopy	
Complications	No. of cases (%)	Complications	No. Of cases (%)
Abdominal pain	3 (6%)	Abdominal pain	1 (3%)
PID	2 (4%)	Shoulder pain	1 (3%)
Total	5 (10%)	Total	2 (6%)

Out of 31 patients with normal HSG, one patient conceived, nine patients refused for laparoscopy, five patients were lost for follow up as shown in Figure 2. Hence all 19 patients with abnormal HSG and 16 patients with normal HSG underwent for laparoscopy. Out of 35, primary infertility cases were 24 and secondary cases were 11. On laparoscopy 7 (20%) patients were observed with uterine abnormalities, 15 (43%) with tubal factors, 10 (29%) with ovarian defects, 7 (20%) with peritoneal factors and 4 (11%) with unknown etiology as presented in Table 6.

Table 7 presents the results of chromopertubation test on laparoscopy in tubal defective patients. 43% of cases had shown tubal defects on laparoscopy. Bilateral positive was present in majority of cases (63%) followed by unilateral positive in 20% cases and bilateral negative in 11% cases. Delayed spillage was present only in 3% cases.

On completion of HSG and laparoscopy a total of 7 patients had shown some complications. After HSG, three patients had abdominal pain and two patients had PID. After laparoscopy, one patient had abdominal pain and one had shoulder pain as given in Table 8.

DISCUSSION

Infertility is a socio-medical problem. The number of couples seeking medical help for infertility is increasing dramatically.[12] This problem is compounded by the trend towards delayed marriage and delayed child bearing to achieve socio-economic, educational and professional goals.[13] Today, in the era of scientific advancement and technology, newer diagnostic modalities have paved the path for further insight into this problem.

Leading causes of infertility are tubal, uterine, ovarian and peritoneal factors. Tubal pathology is one of the major contributory factors in female infertility. Tubal factors includes bilateral tubal blockage, unilateral tubal blockage, tubal scarring or other tubal problems like hydrosalpinx , tubal occlusion mass or peritubal adhesions.[14,15] Uterine factors includes mullerian anomalies, hypoplastic uterus, fibroid uterus and endometrial abnormalities.[16] Ovarian factors includes polycystic ovarian disease, streak ovaries, ovarian cysts.[17] Peritoneal factors includes endometriosis, pelvic adhesions and pelvic tuberculosis.[15] Standard infertility testing should be performed on all couples an if no other cause of infertility is found, then diagnosis of unexplained infertility may be considered.

HSG and diagnostic laparoscopy are the two main modalities for the evaluation of infertility. HSG is used in the examination of uterine cavity and tubal patency for patients with infertility and diagnostic laparoscopy Because of its potential diagnostic and therapeutic benefit, is recommended to all patients prior to any advance procedure in infertility management. However it is reported that evaluation of infertility is incomplete without diagnostic laparoscopy.[18]

In our study, patients who had primary infertility were 68% and patient who had secondary infertility were 32%. Our incidence is comparable to the incidence in the study conducted by Saini et al.[19] In this study 79% of patients with primary infertility and 12.5% with secondary infertility were exposed under the age group 21-25 years and 17% with primary infertility and 50% with secondary infertility was observed under the age group 26-30 years. These observations were comparable to the studies of Sharma et al and Sortey et al in which patients with primary infertility belonged to age group 21-25 years were 62.2% and 41.5% respectively and patients with secondary infertility belonged to age group 26-30 years were 47.2% and 43.5% respectively.[20,21]

In present study, 24 patients (71%) with primary infertility and 5 patients (31%) with secondary infertility had duration of infertility between 1-5 years and this was similar to the observations made by Agarwal et al, patients who had infertility duration between 1-5 years were 72(75%) with primary infertility and 28(60.7%) with secondary infertility.[22]

In our study in secondary infertility maximum number of patients that in 50% had previous history of spontaneous abortions followed by 19% patients with previous normal delivery. Previous preterm delivery and intrauterine death were present in 6% patients each. These were compared with studies conducted by Dorr et al and Sharma et al.[23,24]

On HSG, corneal obstruction was observed in total 49% patients and mid-segmental obstruction in 21% patients in contrast to studies conducted Siegler et al, in which corneal obstruction was present in 20.5% and mid segmental obstruction was present in only 5.7% patients.[25]

In studies performed by Sortey et al, Chakraborti et al uterine abnormalities were noticed in 11% and 14% patients respectively on diagnostic laparoscopy.[21,26] In contrast to their result, we observed 20% patients with infertility related to uterine factors. In our study, tubal factors were present in 43% patients which were compared with other studies performed by Chakraborti et

al and Bhide in which tubal factors were present in 39% and 42.9% patients respectively.[26,27] Present study reveals that on laparoscopy ovarian factors were found to be responsible in 29% patients included 14% patients with PCOD, 6% with ovarian cysts, 3% with streak ovaries and 6% with enlarged ovaries. These observations were compared with observations of Coltart in which ovarian factors were existed in 28.7% patients.[28] On laparoscopy peritoneal factors were noticed in 20% patients in which endometriosis was noticed in 8% cases that was similar to reports of Sharma et al in which endometriosis was present in 6.6%.[24] Another study conducted by Bhide et al, reported peritoneal factors were responsible in 10.9% cases.[27] Unexplained infertility was examined in 11% cases. The percentage of unexplained infertility (11%) in our study was similar to the reports revealed by Samal et al i.e. 18% cases.[29]

In this study, on chromopertubation test in laparoscopy, bilateral negative spill was present in 11% cases, bilateral positive spill was present in 63% cases and unilateral positive spill was present in 20% cases. Delayed spillage and not perceived were present in 3% cases each. These were compared with other study conducted by Sharma, in which bilateral negative spill, bilateral positive spill, unilateral positive spill, delayed spillage and not perceived spillage were present in 17.7%, 55.5%, 3.5%, 6.2%, and 16.8% respectively.[24] In our study, on laparoscopy, complications were reported in 6% cases which was related to the results of Saini et al in which complications were present in 10% cases.[19]

CONCLUSION

Laparoscopy and hysteroscopy distinguishes pelvic pathology which can appear to be normal on other imaging modalities and provides direct visualization as well as treatment of the diseased condition. Laparoscopy and hysteroscopy combined together are valuable technique for complete assessment of female factors of infertility patient and should be used early in the diagnostic work up in cases of infertility.

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