



## EVALUATION OF FEMALE INFERTILITY BASED ON DIAGNOSTIC HYSTEROLAPAROSCOPY FINDINGS AT A TERTIARY TEACHING HOSPITAL

### Obstetrics & Gynecology

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### ABSTRACT

**Objectives:** World Health Organisation defined infertility as failure to conceive after 12 months or more of regular unprotected sexual intercourse. Infertility affects 10-15 % of reproductive age couples. The main causes of infertility include male factor, ovulatory disorders, tubal factor and endometriosis. The objective of present study was to determine the role of diagnostic hysteroscopy in the evaluation of female infertility. **Methods:** This is a prospective study conducted in a tertiary teaching hospital over a period of 5 years from January 2017 to December 2021. Diagnostic hysteroscopy was performed on 135 patients presented to the Department of Obstetrics and Gynaecology with the complaint of infertility. The clinical and hysteroscopy findings were analysed. **Results:** Out of 135 women with infertility recruited for the study, 91 cases (67.41%) had primary infertility and 44 cases (32.59%) had secondary infertility. Combined hysteroscopy showed significant pathology in 72 cases (79.12%) of primary infertility and 28 cases (63.64%) of secondary infertility cases. In both the groups, ovarian pathology was the most common finding. Polycystic ovaries were seen in 62.64 % of primary infertility cases and 38.64% of secondary infertility cases. Septum was the most common hysteroscopic finding. **Conclusion:** Combined hysteroscopy is a reliable method in comprehensive evaluation of female infertility. Hysteroscopic findings help in designing individualized, evidence-based treatment plan for the women with infertility.

### KEYWORDS

Infertility, Laparoscopy, Hysteroscopy, Chromoperturbation

### INTRODUCTION

According to WHO, Infertility is a disease of the reproductive system defined by failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse<sup>1</sup>. 10-15% of reproductive age couples are affected by infertility<sup>2</sup>. Infertility can be either primary infertility or secondary infertility. The primary infertility patients are those who have never conceived before whereas secondary infertility means failure to conceive following at least one prior conception regardless of the site, duration and outcome of pregnancy<sup>3</sup>. Female factor is responsible for 40-45 % of etiology of infertility<sup>4</sup>. Female infertility can be broadly divided into ovulation disorders, tubal pathology, peritoneal factors, uterine abnormalities and cervical factors.

Evaluation of ovulation, tubal patency and endometrial cavity in female and semen analysis of male are cornerstones of evaluation of any infertile couple. However routine clinical examination and usual diagnostic procedures like ultrasonography and hysterosalpingography often fail to correctly identify many pelvic pathologies like endometriosis, pelvic adhesions and tubal patency.

Laparoscopy helps in direct visualisation of the uterus, fallopian tube, ovaries and adnexa. Hysteroscopy permits the visualisation of endocervical canal, uterine cavity, endometrium and tubal ostia. Combined laparoscopy and hysteroscopy is considered as the gold standard for evaluation of female infertility because the uterus, tubes, adnexa, peritoneum, uterine cavity and tubal patency can be assessed and in few conditions therapeutic procedures like septal resection, adhesiolysis, PCOS drilling, tubal cannulation can be done in the same sitting if required<sup>5</sup>.

In patients without any overt clinical manifestations, hysteroscopy can be used as an excellent diagnostic modality to detect hidden pathologies.

Hysteroscopy is an effective, safe, reliable and minimal invasive tool in comprehensive evaluation of infertility and therapeutic intervention<sup>6</sup>. We conducted a prospective study of patients with

primary as well as secondary infertility to understand the role of hysteroscopy in accurately identifying and addressing pelvic pathologies in the evaluation of female infertility

### AIMS AND OBJECTIVES

1. To evaluate the role of hysteroscopy in comprehensive work up of infertility in a rural tertiary teaching hospital
2. To estimate the incidence of various factors leading to infertility
3. To assess the complications of the procedure
4. To assess the demographic profile of women with primary and secondary infertility

### MATERIALS AND METHODS

The present study on the role of diagnostic hysteroscopy in the evaluation of female infertility was conducted in the Department of Obstetrics and Gynaecology at Medici Institute of Medical Sciences, Ghanpur, Medchal, Hyderabad, Telangana State, India over a period of 5 years from January 2017 to December 2021. All patients in the age group of 20-35 years with either primary or secondary infertility who underwent hysteroscopy were enrolled for the study. Patients with abnormal hormone profile, male factor infertility, acute pelvic inflammatory disease or any contraindication to the procedure were excluded from the study.

Basic infertility workup like history, examination, pelvic ultrasonography, hormone analysis which includes serum prolactin and thyroid stimulating hormone and husbands' semen analysis was done. Total 135 infertile women were subjected to diagnostic hysteroscopy to find out the cause of infertility. This was done in the proliferative phase between 8<sup>th</sup> to 10<sup>th</sup> day of menstrual cycle under general anaesthesia. The diagnostic hysteroscopy was done with a 4 mm, 30 degree fiberoptic rigid hysteroscopy with a 5 mm diagnostic sheath. After distending the uterine cavity with normal saline; uterine cavity, anterior wall, posterior wall, fundus and both tubal ostia visualised. Any abnormalities in uterus like septum, polyp and fibroid were looked for and documented. Laparoscopy was done with one 10 mm and two 5 mm port. With the telescope, inspection of all pelvic structures including ovaries, fallopian tubes, uterus, any abnormalities

like endometriosis and adhesions was performed. Finally tubal patency test was done by introducing methylene blue dye into the uterus and spillage from fimbrial end was noted (chromopertubation). In few cases, any abnormal findings on hysteroscopy were addressed by corrective surgical procedures like ovarian drilling, tubal cannulation, ovarian cystectomy, endometrial polypectomy and septal resection in the same sitting.

#### Statistical Analysis :

The findings on diagnostic hysteroscopy were documented and analysed. All the categorical variables were expressed as proportions and incidence of each finding was calculated.

#### RESULTS

During our study period diagnostic hysteroscopy was done on 135 women. Out of total 135 women, 91 women (67.41%) had primary infertility and 44 women (32.59%) had secondary infertility.

**Table 1: Demographic characteristics of study of women with infertility**

|                                  | Primary Infertility Number (Percent) | Secondary Infertility Number (Percent) | Total Number (Percent) |
|----------------------------------|--------------------------------------|----------------------------------------|------------------------|
| Age Distribution (years)         |                                      |                                        |                        |
| 20-25                            | 40 (43.96 %)                         | 11 (25 %)                              | 51 (37.78 %)           |
| 26-30                            | 41 (45.05 %)                         | 28 (63.64 %)                           | 69 (51.11 %)           |
| 31-35                            | 10 (10.99 %)                         | 5 (11.36 %)                            | 15 (11.11 %)           |
| Duration of Infertility. (years) |                                      |                                        |                        |
| 1-5                              | 71 (78.02 %)                         | 26 (59.09 %)                           | 97 (71.85 %)           |
| 6-10                             | 17 (18.68 %)                         | 15 (34.09 %)                           | 32 (23.70 %)           |
| > 10                             | 3 (3.30 %)                           | 3 (6.82 %)                             | 6 (4.44 %)             |
| BMI (kg/m2)                      |                                      |                                        |                        |
| <18.5                            | 6 (6.59 %)                           | 2 (4.54 %)                             | 8 (5.93 %)             |
| 18.5-24.9                        | 36 (39.56 %)                         | 18 (40.91 %)                           | 54 (40 %)              |
| 25-29.9                          | 30 (32.97 %)                         | 14 (31.82 %)                           | 44 (32.59 %)           |
| ≥30                              | 19 (20.88 %)                         | 10 (22.73 %)                           | 29 (21.48 %)           |
| Menstrual cycles                 |                                      |                                        |                        |
| Regular                          | 52 (57.14 %)                         | 29 (65.91 %)                           | 81 (60 %)              |
| Irregular                        | 39 (42.86 %)                         | 15 (34.09 %)                           | 54 (40 %)              |

The analysis of age groups of the study cases showed that the majority of the patients belonged to age group of 26-30 years ( 51.11 %) followed by 20-25 years (37.78 % ). Among the primary infertility cases 45.05 % patients belonged to age group 26-30 years and 43.96 % patients belonged to age group 20-25 years, whereas in secondary infertility group 63.64 % belonged to 26-30 years age group and 25 % belonged to 20-25 years age group. The patients in primary infertility group were slightly younger compared to secondary infertility group.

Inability to conceive for a period of 1-5 years was seen in 97(71.85%) women and for a period of 6-10 years in 32 (23.7 %) women. Six women couldn't conceive even after 10 years of unprotected intercourse. With respect to BMI, normal weight was seen in 40% of women. However, 6% of women were underweight, 32% were overweight and 22% were obese. Out of the 135 infertility cases, abnormal uterine bleeding was seen in 54 (40%) women.

**Table 2 : Findings in Laparoscopy and Hysteroscopy**

| Procedure    | Primary Infertility |              | Secondary Infertility |               |
|--------------|---------------------|--------------|-----------------------|---------------|
|              | Normal              | Abnormal     | Normal                | Abnormal      |
| Laparoscopy  | 29 (31.87 %)        | 62 (68.13 %) | 26 (59.09 %)          | 18 (40.91 %)  |
| Hysteroscopy | 76 (83.52 %)        | 15 (16.48 %) | 30 (68.18%)           | 14 ( 31.82 %) |
| Hysteroscopy | 19 (20.88 %)        | 72 (79.12 %) | 16 (36.36 %)          | 28 (63.64 %)  |

According to Table 2, abnormal hysteroscopic findings were seen in 79.12 % of women with primary infertility and in 63.64 % of women with secondary infertility.

Multiple abnormalities were also detected on hystero-laparoscopy in both primary and secondary infertility cases.

**Table 3: Laparoscopic findings in Primary and Secondary Infertility**

|               | Primary Infertility | Secondary Infertility | Total        |
|---------------|---------------------|-----------------------|--------------|
| Normal        | 29 ( 31.87 %)       | 26 ( 59.09 %)         | 55 (40.74%)  |
| PCOD          | 57 (62.64 %)        | 17 (38.64 %)          | 74 (54.81 %) |
| Tubal Block   | 8 (8.79 %)          | 3(6.82 %)             | 11 (8.15 %)  |
| Endometriosis | 5 (5.49 %)          | 1(2.27 %)             | 6 (4.44 %)   |
| Ovarian Cyst  | 3 (3.29 %)          | -                     | 3 (2.22 %)   |
| Adhesions     | 2 (2.20 %)          | -                     | 2 (1.48 %)   |
| Fibroid       | -                   | 2 (4.54 %)            | 2 (1.48 %)   |

**Table 4 : Hysteroscopic findings in Primary and Secondary Infertility**

|                    | Primary Infertility | Secondary Infertility | Total         |
|--------------------|---------------------|-----------------------|---------------|
| Normal             | 76 (83.52 %)        | 30 (68.18 %)          | 106 (78.52 %) |
| Septate/Subseptate | 9 (9.89%)           | 10 (22.73 %)          | 19 (14.07 %)  |
| Polyp              | 4 (4.40 %)          | 2 (4.54 %)            | 6 (4.44 %)    |
| Submucous Fibroid  | 2 (2.20 %)          | 2 (4.54 %)            | 4 (2.96 %)    |

Table 3 and 4 show the various laparoscopic and hysteroscopic findings in women with infertility. The most common pathology noted during laparoscopy in both primary and secondary infertility group was polycystic ovarian disease (62.64 % vs 38.64 %). In all patients with polycystic ovarian disease, ovarian drilling was performed. Endometriotic lesions were seen in 4 women with primary infertility and one woman with secondary infertility. Adhesions were seen in only 2.2 % of women with primary infertility. Adhesions were mainly adnexal, tubal, peritoneal, omental and subdiaphragmatic. Incidental ovarian cyst was seen in 3 women with primary infertility.

On chromopertubation, 8 cases among primary infertility and 3 cases among secondary infertility women failed to show tubal spillage. Table 3 shows the most common hysteroscopic abnormality as septate and subseptate uterus in both the primary and secondary infertility groups (9.89 % vs 22.73 % ). Other attributing pathologies in hysteroscopy were endometrial polyp (4.44 %) and submucous myoma (2.96 %). All cases of endometrial polyps found in our study underwent polypectomy and endometrial tissue sampling was done . No major anaesthetic or surgical complications occurred. The only complaint was mild abdominal pain

#### DISCUSSION

In the present study, out of 135 patients, 67.41% patients had primary infertility while 32.59% patients had secondary infertility. Similar findings were observed by J.J.K Annan et al<sup>7</sup> and Benksim et al<sup>8</sup>. In a study by Datti SN et al<sup>9</sup> out of 120 cases, 92 cases (77.37%) had primary infertility and 28 cases (22.69%) had secondary infertility. Similar to these studies, our study also showed that women with secondary infertility were slightly older than women with primary infertility. This may be explained by the fact that women having had a prior conception may delay consultation expecting that they will conceive spontaneously again soon. In the present study more than 50% of the patients belonged to age group of 26-30 years. In a study conducted by Antaratani RC et al<sup>10</sup> 39.1% of cases were in the age group of 26 - 30 years. In the present study, women with primary and secondary infertility were of mostly normal weight. On the contrary , in a study by Mandal et al<sup>11</sup> most of the women were obese or overweight . Overweight women have higher incidence of menstrual dysfunction , anovulation and hyperandrogenemia which leads to infertility. Excessive peripheral aromatisation of androgens to oestrogen can affect the gonadotropin secretion. On the contrary, underweight women have fewer fat cells and thereby make lesser estrogen . This hormonal imbalance leads to irregular menstrual cycles and anovulation.

Abnormalities detected in laparoscopy (68.13% and 40.91% ) were more common than those in hysteroscopy (16.48% and 31.82%) both in primary and secondary infertility group. Similar findings were noted in a study by Shilpa G et al<sup>6</sup>. In the present study , laparoscopic evaluation showed , majority of patients had polycystic ovaries(54.81%) , followed by tubal block ( 8.15%) which was comparable to a study by Shanmugham D et al<sup>12</sup>. PCOS was the commonest attributable cause (22%) of infertility in the study conducted by Puri et al<sup>13</sup>. Study by Kabadi et al<sup>14</sup> also found ovarian pathology (20.8%) as the most common laparoscopic abnormality among infertility patients. Since ours is a tertiary care centre, many cases of ovarian cyst and PCOS were referred for laparoscopic

treatment, which may be the cause for higher percentage of such cases in our study. The most common cause of anovulatory infertility is PCOS. Most women with PCOS have elevated levels of luteinizing hormone, reduced levels of follicle-stimulating hormone (FSH) and elevated levels of androgens and insulin<sup>15</sup>. Because of these hormonal imbalances PCOS can manifest as oligomenorrhea or amenorrhea.

Tubal factor needs to be evaluated before starting any fertility treatment. Though tubal patency can be diagnosed by hysterosalpingography and saline infusion sonography the gold standard investigation is laparoscopy and chromopertubation. In present study, chromopertubation test showed tubal block in 8.79% cases of primary infertility and 6.82% cases of secondary infertility group. Similar to our study Devarsetti et al<sup>16</sup> study also didn't find any significant difference in incidence of tubal blocks in patients with primary and secondary infertility. Other studies like Karya U et al<sup>17</sup> reported 20.68 % tubal pathology whilst Nayak PK et al<sup>18</sup> reported 8%. Tubal blockage or hydrosalpinx due to infection is the most common cause of tubal factor infertility. Besides infections other conditions like endometriosis, sexually transmitted diseases, pelvic inflammatory diseases and abdomino-pelvic surgeries can lead to blocking and scarring of fallopian tube.

Though endometriosis is an important cause of infertility, in our study population only 3.7% of women had endometriosis. A study by J.J.K. Annan et al<sup>7</sup> showed similar findings (1.79%). Endometriosis can cause infertility in various ways like adhesions, scarred fallopian tube, distorted anatomy of pelvis, changes in the hormonal environment and altered immune system functioning.

Majority of our patients had a normal uterine cavity and cervical canal on hysteroscopy. Abnormalities were detected in 16.48 % cases of primary infertility and 31.72 % cases of secondary infertility similar to Wadadekar GS et al study<sup>19</sup>. In as many as 15 % of couples seeking treatment for infertility, uterine pathologies are the cause<sup>20</sup>.

Developmental uterine anomalies can cause infertility by preventing implantation. Common uterine disorders detected during hysteroscopy and implicated in infertility are septae, polyps, submucous myomas, adenomyosis and anomalies of cervical canal. Among all congenital uterine abnormalities, septate uterus is the most common cause associated with highest reproductive failure rate<sup>21</sup>. In our study the most common hysteroscopic abnormality detected was septate uterus in both primary infertility (9.89%) and secondary infertility group (27.73%). A septum results in poor implantation and embryo growth because of poor blood supply and uterine cavity distortion. Though a diagnosis of septate/subseptate uterus is not an indication for septoplasty, the reproductive outcome of women with septum is rather poor. Surgical correction of septum, can improve the pregnancy rates dramatically with 80% term delivery, 5% preterm delivery and 15% pregnancy loss<sup>22</sup>. Hysteroscopic septal resection is a safe, easy procedure and associated with low morbidity and minimal complications.

Similar to Nayak et al study<sup>18</sup>, the other major hysteroscopic abnormalities reported in our study were myomas and polyps. Submucous fibroids can interfere with sperm or ovum transport and hamper embryo implantation due to poor regional blood flow, obstruction of ostia and deformity of cavity. Endometrial polyps can also cause infertility by distorting the cavity, interfering with embryo implantation and causing local inflammatory changes.

Postoperative period was uneventful in most of our patients. Other than mild postoperative pain, there were no other major intraoperative or postoperative surgical or anaesthesia complications. Careful patient selection, preoperative preparation and following principles of enhanced recovery programme are of utmost importance to reduce the complications.

## CONCLUSION

Hysterolaparoscopy serves as an indispensable and excellent diagnostic tool for evaluation of female infertility. It helps in the diagnosis of pelvic pathology, particularly for detecting endometriosis, adhesions and septum in the uterus which can be missed by routine pelvic and radiological examination. Hysterolaparoscopy gives the added advantage of doing a therapeutic procedure like ovarian drilling in PCOS, adhesiolysis, polypectomy and septal resection in the same sitting. As it is a safe procedure with

minimal complications, all eligible patients should be offered combined hysterolaparoscopy before initiation of definitive management. It may be recommended as the final procedure for evaluation of female infertility.

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