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ORIGINAL ARTICLE

The Role of Diagnostic Hysteroscopy in Evaluating Infertile Women with Normal Hysterosalpingogram

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ABSTRACT

BACKGROUND: There is ongoing debate on the appropriateness of regular hysteroscopy (HSC) in patients having diagnostic laparoscopy as part of an infertility evaluation. A rising body of research is addressing the use of hysterosalpingography (HSG) as a crucial tool for the assessment and treatment of infertile couples, despite the fact that most clinics still utilize HSG as their standard test to evaluate the uterine cavity. Thus, our goal was to assess the diagnostic hysteroscopy's function in infertile women with normal HSG.

METHODS: A cross sectional study was conducted at the Department of Obstetrics and Gynecology, at Zagazig university Hospitals in the period from December 2023 till May 2024 including 90 women having infertility. Diagnostic Hysteroscopy was done for all cases.

RESULTS: Majority of cases had primary infertility (78.9%) and among the studied cases cervical stenosis and endometrial polyp were the most frequent abnormalities (5.6% for each), followed by Intrauterine adhesions, then Submucous myoma, then Chronic endometritis and Cervical Polyp (4.4%, 3.3%, 2.2%, 1.1% and 1.1% respectively. There was no significant difference between the cases who detected abnormality and who didn't as regard age, period of infertility,BMI, and type of infertility.

CONCLUSIONS: We believe that the use of diagnostic hysteroscopy in the primary routine assessment of infertile women is justified because the incidence of uterine diseases (both congenital and acquired) in women with primary or secondary infertility is approximately 23.3%. When the hysterosalpingeogram is normal, the diagnostic hysteroscopy is equally important in evaluating individuals with primary and secondary infertility.

Keywords: Diagnostic Hysteroscopy; Infertile Women; Normal Hysterosalpingogram.

INTRODUCTION

Infertility is known as the inability to conceive after a year of unprotected sexual activity for women over 35 or six months for women under 35 **[1].** Fertility tests frequently rely more on custom and individual choice than

on the proven value of the several components that are available **[2].**

The likelihood of implantation may be adversely affected by uterine disease. It has been found that up to 50% of asymptomatic women with implantation failure had undetected uterine disease. Thus, a hysteroscopy to assess the uterine cavity is one of the frequently suggested tests for women receiving IVF treatment **[3].**

Indeed, up to 10% to 15% of couples seeking therapy have infertility linked to anomalies in the uterus cavity as the underlying cause **[4].** In infertility investigations, hysteroscopy is used to identify any intrauterine abnormalities that can impede growth, implantation, or both **[5].** Research has indicated that there is only a 65% concordance between findings from hysteroscopy and those from HSG **[6].**

METHODS

This cross-sectional study was conducted on 90 infertile women at Zagazig University Hospitals' Department of Obstetrics and Gynecology between December 2023 and May 2024. Each participant provided written, informed consent. The Ethical Committee of faculty of medicine, Zagazig University gave its approval to this study (IRB number 9823-20-9-2022).

Inclusion criteria include women aged between 20 and 35,women who have infertility, either primary or secondary ,couples who have never been able to conceive due to primary infertility. Secondary infertility refers to the wife's incapacity to conceive, carry her pregnancy to term, or suffer a miscarriage [7]. ,Hystrosalpingiogram is normal, regular cycle with no male influence.

Exclusion criteria include The patient's age ranges from under 20 to over 40 ,hysteroscopy contraindications include bleeding, suspected or proven pregnancy, and a history of vaginal or cervical discharge that could indicate an active infection, The patient's HSG is abnormal,

Couples with aberrant semen parameters and/or sexual dysfunctions are considered male factor infertile **[8].**

A thorough medical history, clinical examination, blood testing for a baseline hormonal profile (day 2 serum levels of FSH, LH, and prolactin) and ultrasound were all performed for each patient.

Office hysteroscopic examination

A skilled team performed the postmenstrual hysteroscopy, It was a diagnostic hysteroscopy using a rigid continuous flow (Tuttligen, Karl Storz, Germany). Its 30 degree panoramic optic measures 4 mm in diameter, while its diagnostic continuous flow outer sheath measures 6.5 mm. In the lithotomy position, the patient's buttocks extended slightly over the edge of the table. Povidone-iodine was gently swabbed onto the vagina and perineum. A posterior wall retractor was used to reveal the cervix, and a tenaculum was placed on the anterior lip. After inserting the telescope into the sheath, any remaining air was drained out using saline, a distension medium. Attaching plastic saline bags to dual blood infusion tubes was the method utilized to provide uterine distension. A pressure infusion cuff, which is identical to the one used to infuse blood under pressure, was then put around each bag. The pressure employed was 100 mmHg. An Olympus reflex camera with an objective whose focal length range from f70 to f140, along with a specific zoom length (Karl Storz), a Hopkins telescope adapter, and the appropriate cable for a computer flash unit. The camera mounted on the optic's eyepiece transmits the hysteroscopic image that emerged through the lens to the monitor, allowing for more precise and clear vision of the panoramic diagnostic hysteroscopy. The high cable was connected to the hysteroscope, and the 150-watt metal halide automated light source (type G71A, Circon ACMI, Germany) for the light generator was switched on. The hysteroscope was then placed into the external os and moved under vision along the axis of the cervical canal.

An examination of the uterine cavity was conducted once the cavity had been accessed. After that, the telescope was slowly rotated to examine the uterine wall, tubal ostia on both

sides, and fundus in a methodical manner. If the endometrial cavity could be readily enlarged by the medium, its walls were completely separated, and both tubal ostia could be seen, the examination was deemed normal. Intrauterine adhesions (IUAs) were indicated by the closure of the ostial area or higher cavity, the appearance of wide bands crossing the cavity, or the agglutination of the uterine walls. A longitudinal depression from the fundus down to a variable level showed the presence of a uterine septum. Any further troublesome lesions, including polyps or submucous myomas, were noted along with their location, size, and vascularity. At the end of treatment, the hysteroscope was carefully withdrawn through the cervical canal to check for lesions.

Statistical analysis

The collected data was coded, tabulated, and statistically analyzed using IBM SPSS statistics (Statistical Package for Social Sciences) software version 28.0, IBM Corp., Chicago, USA, 2021. To determine if quantitative data is normally distributed, one can apply the Kolmogorov-Smirnov test. If so, an independent t-test is employed for comparison, and the mean±SD (standard deviation) and the lowest and greatest values in the range are provided. When comparing qualitative data that is presented as percentages and figures, Fisher's Exact test is utilized. A p-value was deemed significant if it was less than 0.050; if not, it was deemed non-significant.

RESULTS

Age (years), BMI (kg/m2), and infertility duration (years) had respective means±standard deviations of 27.5±3.9, 28.9±3.0, and 3.5±1.3. Primary infertility accounted for the majority of cases (78.9%). Diabetes mellitus, hypertension, and pelvic surgery were uncommon (2.2%, 6.7%, and 2.2%, respectively). (Table 1). Uterine cavity was normal in 76.7% of cases and abnormal in 23.3% of studied cases (Table 2). The most common anomalies were cervical stenosis and endometrial polyps (5.6% each), while intrauterine adhesions, submucous myomas, chronic endometritis, and cervical polyps (4.4%, 3.3%, 2.2%, 1.1%, and 1.1% respectively) came next. (Table 3) .Hysteroscopy results showed no discernible difference in clinical history or demographic traits. (Table 4).

Table (1): Demographic characteristics and clinical history among the studied cases

Variables		Mean±SD	Range
Age (years)		27.5±3.9	20.0–35.0
BMI (kg/m^2)		28.9±3.0	20.6–36.5
Duration of infertility (years)		3.5±1.3	1.0–7.0
		N	**%**
Type of infertility	**Primary**	71	78.9%
	Secondary	19	21.1%
Hypertension		2	2.2%
Diabetes mellitus		6	6.7%
Pelvic surgery		2	2.2%

Total=90. BMI: Body mass index.

Table (2): Hysteroscopy abnormalities among the studied cases

Status	N	%
Abnormal	21	23.3%
Normal	69	76.7%

Total=90

Table (3): Details of hysteroscopy abnormalities among the studied cases

Abnormalities	From all cases (Total=90)	From abnormal cases (Total=21)
Cervical stenosis	5 (5.6%)	5 (23.8%)
Endometrial Polyp	5 (5.6%)	5 (23.8%)
Intrauterine adhesions	4 (4.4%)	4 (19.0%)
Submucous myoma	3 (3.3%)	3 (14.3%)
Cornual fibrosis	2 (2.2%)	2 (9.5%)
Chronic endometritis	1 (1.1%)	1 (4.8%)
Cervical Polyp	1 (1.1%)	1 (4.8%)

Table (4): Comparison according to hysteroscopy findings regarding demographic characteristics and clinical history.

Variables		Hysteroscopy findings		p-value
		Abnormal (Total=21)	Normal (Total=69)	
Age (years)		28.8±4.1	27.1±3.7	^0.082
BMI (kg/m^2)		28.2±3.2	29.1±2.9	^0.243
Duration of infertility (years)		3.2±1.0	3.6±1.3	^0.324
Type of infertility	**Primary**	15 (71.4%)	56 (81.2%)	§0.367
	Secondary	6 (28.6%)	13 (18.8%)	
Hypertension		1 (4.8%)	1 (1.4%)	§0.414
Diabetes mellitus		1 (4.8%)	5 (7.2%)	§0.999
Pelvic surgery		1 (4.8%)	1 (1.4%)	§0.414

^Independent t-test. §Fisher's Exact test.

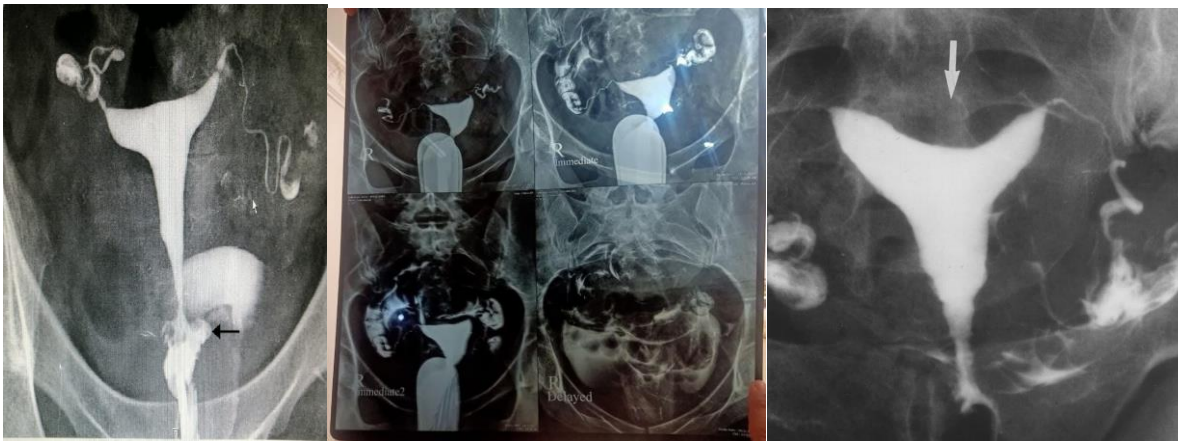

Figure (1): Normal Hysterosalpingeogram

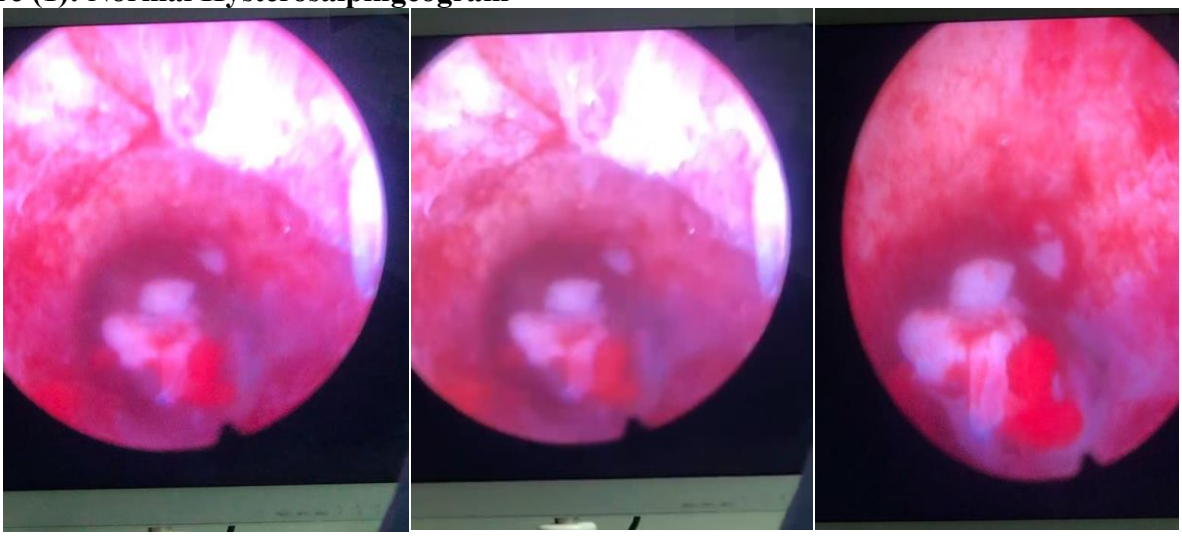

Figure (2): Diagnostic Hysteroscopy Showing Cervical Polyp

Figure (3) Diagnostic Hysteroscopy Showing Endometrial Polyp

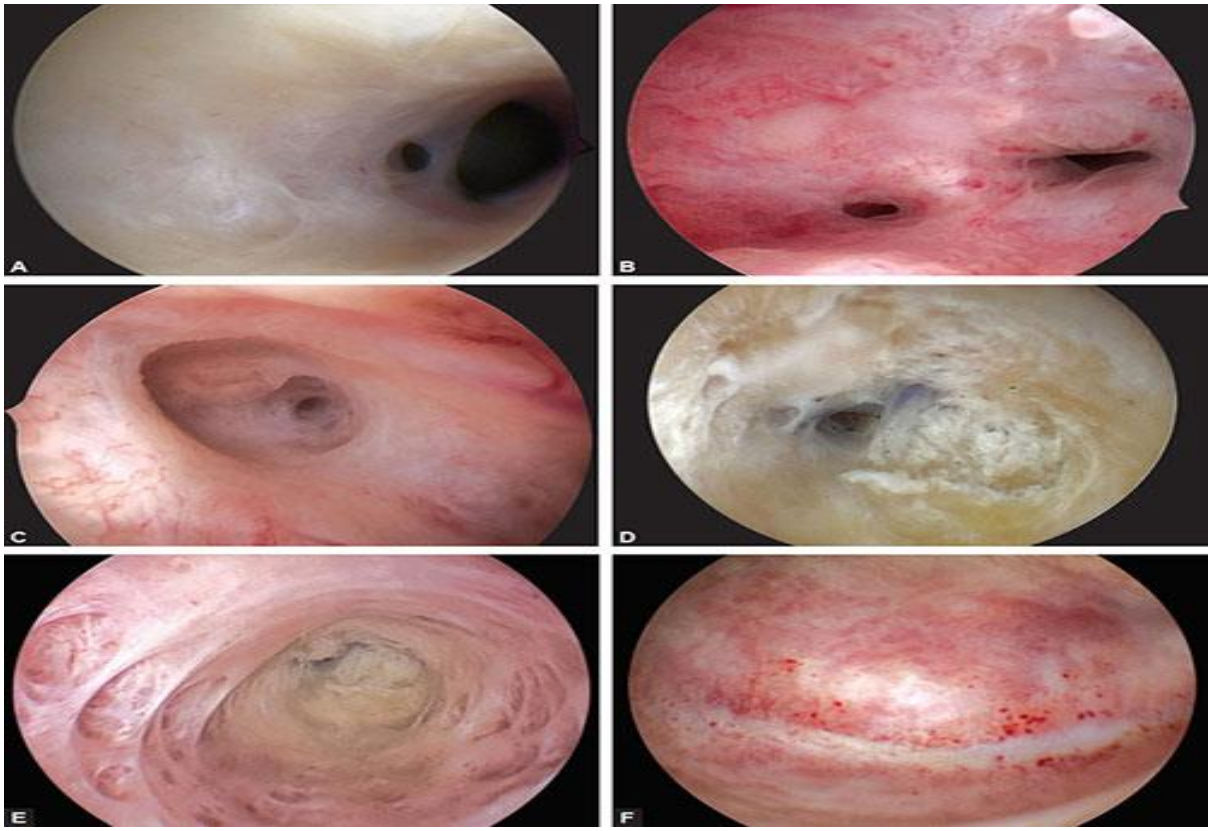

Figure (4): Diagnostic Hysteroscopy Showing Intrauterine Adhesions

DISCUSSION

If a woman under the age of thirty-five is unable to conceive after a year of unprotected sexual activity, or after six months of unprotected sexual activity for women over thirty-five, she is considered infertile. Fertility tests are frequently conducted based less on the proven value of the numerous components available and more on custom and individual desire **[9].**

Nowadays, hysteroscopy is the gold standard for evaluating the uterine cavity which can now be done safely and reliably in an office setting because to advancements in endoscopic technology. It is commonly acknowledged that an examination of the uterus should be part of a comprehensive infertility workup **[10].**

Indeed, it has been estimated that up to 10% to 15% of couples seeking therapy have infertility caused by anomalies in the uterus cavity. Furthermore, 34% to 62% of infertile women have abnormal uterine results. The likelihood of implantation may be adversely affected by the existence of uterine disease **[3].**

When investigating infertility, hysteroscopy is used to identify any intrauterine abnormalities that might impede the conceptus's implantation, growth, or both **[11].**

In order to evaluate the effectiveness of diagnostic hysteroscopy in infertile women with normal HSG, this study was selected.

Between December 2023 and May 2024, 90 infertile women participated in a cross-sectional study at Zagazig University Hospitals' Department of Obstetrics and Gynecology.

The average age of the cases under study was 27.5 ± 3.9, with a range of 20 to 35; the average infertility period was 3.5 ± 1.3, with a range of 1 to 7; the average BMI was 28.9 ± 3, with a range of 20.6-36.5; 71 (78.9%) of the cases had primary infertility, and 19 (21.1%) had secondary infertility.

Our findings are corroborated by a 2019 study by **Amirian et al., [12]** which found that the attending patients' mean age was 30.9 ± 5.4 years, and that they had been infertile for 4.1 ± 5.2 years. Of them, 71.8% had the predominant form of infertility.

Furthermore, **Wadhwa et al., [8]** showed that 108 women in all were examined during the study. The majority experienced primary infertility in 73.14% of cases (79/108) and secondary infertility in 26.85% of cases (29/108). The average age of the ladies in our sample was 27.56 ± 2.80 years. The

age group of 26–28 years old had the highest proportion of women (39.8%; 43/108), followed by 23–25 years old (27.8%; 30/108) and 29–31 years old (23.1%; 25/108). Infertility lasted 5.65 ± 2.54 years on average. 75.93% (82/108) of the ladies had abnormal HSG, whereas 24.07% (26/108) had normal HSG.

It is generally acknowledged that an examination of the uterus should be part of a comprehensive infertility workup. One of the causes of infertility is thought to be uterine anomalies, whether they are acquired or congenital. Indeed, it has been estimated that up to 10% to 15% of couples seeking therapy have infertility caused by anomalies in the uterus cavity. Furthermore, 34% to 62% of infertile women have abnormal uterine findings **[13].**

The current investigation found that 78.9% of cases were primary infertility.Diabetes mellitus, hypertension, and pelvic surgery were among the less common conditions (2.2%, 6.7%, and 2.2%, respectively). Mean±SD values for heart rate (beat/minute), temperature (°C), diastolic blood pressure (mmHg), and systolic blood pressure (mmHg) were 36.9±0.1, 71.3±3.0, 118.4±4.6, and 77.9±3.2, respectively.

According to **Pansky et al. [14],** the most typical reason for a diagnostic hysteroscopy was as a component of an early infertility evaluation. Additional indications included patients that were part of an ongoing workup prior to IVF treatment or following several unsuccessful IVF cycles. In 156 (70%) of the ladies, hysteroscopy showed a normal uterine cavity.

The gold standard for assessing the uterine cavity nowadays is hysteroscopy, which can now be done safely and reliably in an office setting because to advancements in endoscopic technology. Compared to other blind or indirect diagnostic techniques, a direct view of the uterine cavity provides a substantial benefit. The type of the intrauterine filling deficiencies is better revealed by hysteroscopy, even though Fayez stated that hysterosalpingography (HSG) was just as accurate as hysteroscopy in diagnosing normal and abnormal cavities **[15].**

Subsequent research has revealed that the findings from hysteroscopy and HSG diagnoses only correlate by 65%. Hysteroscopy is used in infertility investigations to identify potential intrauterine abnormalities that may impede the conceptus's implantation, growth, or both, and to assess how well various treatment approaches restore a healthy endometrial environment. According to Oliveira, 25% of patients with multiple unsuccessful IVF-ET cycles had substantial, undetected intrauterine anomalies that could only be discovered by hysteroscopy. Within the previous year, the HSG of every patient in his group was normal. More impressively, the clinical pregnancy rate among patients with anomalous uterine cavities at hysteroscopy was greatly enhanced by pertinent treatment interventions **[16].**

According to the current study, the most common anomalies among the cases under investigation were cervical stenosis and endometrial polyps (5.6% each), followed by intrauterine adhesions, submucous myoma, chronic endometritis, and cervical polyps (4.4%, 3.3%, 2.2%, 1.1%, and 1.1% respectively).

Mohamed et al. [17] found that 48 patients (34.3%) had abnormalities in the uterus and cervix during a hysteroscopic examination, which supports our findings. Eight patients had more than one abnormality, totaling 56 abnormalities. Of these, 12 patients had cervical abnormalities, accounting for 21.4% of all abnormalities, and 44 patients had uterine abnormalities, accounting for 78.6% of all abnormalities. Nine occurrences of cervical stenosis were found, making it the most common hysteroscopic finding. In 21.3% of cases, cervical stenosis and cervical polyps were seen.The septum was modest in the two uterine septa cases. Eight patients had intrauterine adhesions; two had strong adhesions and six had mild ones. In the nine cases, cervical stenosis did not obstruct the hysteroscope's ability to examine the uterine cavity.

On hysteroscopy, the uterine cavity was abnormal in 29.91% (32/107) and normal in 70.09% (75/107) of cases, according to **Wadhwa et al. [8].** On hysteroscopy, the most frequent uterine cavity finding was the uterine septum in 11 (10.25%) of the women, followed by ostial fibrosis in 10 (9.34%), endometrial polyps in 5 (4.67%), pale or atrophic endometrium in 8 (7.45%), and Asherman's syndrome in 5 (4.67%).

In a retrospective study conducted by **Taskin et al. [18],** 359 infertile patients between the ages of 18 and 46 who had previously used assisted reproductive technology (ART) at least once were given hysteroscopy and HSG. The patients' average age was 33.3 years, and their infertility lasted an average of 8.3 years. Additionally, 277 patients had normal HSG, but 82 patients had abnormal HSG. Patients with normal HSG underwent hysteroscopy;

81 of them (36.1%) developed diseases. Uterine septum (36 instances), endometrial polyp (26 cases), adhesion (11 cases), and submucous myoma (8 cases) were among the pathological findings. Of the patients, 37 (45.7%) were 35 years of age or older, while 44 (54.3%) were under 35. Among individuals with a higher ART number, more uterine diseases were found (P = 0.15). There was a significant difference (P = 0.004) in the maximum number of uterine diseases found after hysteroscopy in patients over 35.

In addition, **El-Mazny et al. [19]** performed hysteroscopy and laparoscopy on 145 infertile women who had a history of two or more ART procedures and normal hormonal, HSG, and semen analysis tests from their husbands. According to the findings, the patients' average age and length of infertility were 32.2 ± 3.4 and 2.6 ± 1.5 years, respectively. 48 patients had abnormal hysteroscopies. Furthermore, HSG's false negative ratio was 33.1%. The most common uterine diseases were submucosal myoma, intrauterine adhesions, and endometrial polyps. Patients over 35 and those with higher ART levels were the most likely to be diagnosed with such diseases.

In a research by **Hourvitz et al. [20],** 91 out of 93 infertile women with normal uterine cavities in HSG had diagnostic hysteroscopy as part of the laparoscopy procedure. The hysteroscopy was abnormal in 11 patients (12.1%). The false negative percentage for HSG was 12%. Asherman syndrome, arcuate uterus, endometrial polyps, and endometrial hyperplasia were among the other uterine illnesses (2 cases) (4).

Additionally, **Godinjak and Idrizbegovic [21]** used sonography, chlamydia antibody, cervical smear, hormonal testing, and normal semen analysis to analyze 360 infertile patients. All patients between the ages of 23 and 42 who had means of age and duration of infertility of 31 and 6.3 years, respectively, underwent follicular phase laparoscopy and hysteroscopy. According to the findings, 109 patients (24.89%) had abnormal hysteroscopy, while 251 patients (75.11%) had normal hysteroscopy. 42 cases of submucosal myomas (11.6%), 26 cases of endometrial polyps (7.22%), 3 cases of Asherman syndrome (0.8%), and 19 cases of uterine anomalies (5.27%) were among the uterine diseases. Additionally, there were seven cases of uterine septum, five cases of bicornate uterus, three cases of unicorn ate uterus, and four cases of arcuate uterus among the uterine anomalies. 20% of uterine diseases with fast recovery times and low complications (less than 0.01%) were identified concurrently by hysteroscopy and laparoscopy, according to this study.

In the 2013 study by **El Huseiny and Soliman [22],** 344 women (79.63%) had normal hysteroscopic findings. The remaining 88 (20.37%) had hysteroscopy abnormalities. Intrauterine adhesions (IUA) accounted for 31.81% of all reported hysteroscopic abnormalities (28/88) and endometrial polyps for 26.13% (23/88). Only 207 women had access to pre-hysteroscopic uterine investigations (hysterography or ultrasound). In 21 women (14.68%) out of 143 patients with normal pre-hysteroscopic uterine examinations, office hysteroscopy showed abnormalities in the uterine cavity. Of the 64 individuals with abnormal pre-hysteroscopic results, 16 patients (25%) had normal hysteroscopy examinations.

In a different study by **Nigam et al. [23],** 128 infertile women with primary infertility were given HSG. Of them, 100 patients (78.1%) had abnormal HSG, while 28 patients (21.9%) had normal HSG. Patients with normal HSG had hysteroscopy and laparoscopy after that. Furthermore, 18 patients had normal hysteroscopies, while 10 had abnormal ones. Nine (90%) of the identified diseases had uterine adhesions, while one (10%) had an endometrial polyp. For the HSG, the recorded false negative percentage was 12.69%.

Similarly, in a research by **Chauhan et al. [24],** 100 infertile women with normal clinical labs and tests underwent hysteroscopy and HSG. The patients' average age was 30 ± 4 years, and their infertility duration was 4.1 ± 2 years. Of the patients, 36 had secondary infertility and sixty-six had primary infertility. While eighty-seven patients had normal HSG, thirteen patients had abnormal HSG. A 10% false negative HSG ratio was also caused by 10 patients with abnormal hysteroscopies. Furthermore, the sensitivity, specificity, PPV, and NPV of the hysteroscopy were 50%, 98%, 76.9%, and 88.5%, in that order. The diseases identified by the hysteroscopy were submucous myoma (4 cases), endometrial polyp (3 cases), and uterine adhesion (3 cases).

Regarding age, infertility period, BMI, and infertility type, there was no discernible difference between the cases in our study that had abnormalities and those who did not. In terms of diabetes, hypertension, and prior pelvic surgery,

there was no discernible difference between the cases who had abnormalities and those that did not.

The findings of **Pansky et al. [14],** who found no statistically significant difference in the diagnosis of endometrial polyps between the primary and secondary infertility groups (7.6% vs. 4.3%, NS), corroborate our findings. Since many endometrial polyps are clinically asymptomatic, it is challenging to estimate their actual occurrence in the general population. Despite the established link between secondary infertility and the presence of adhesions, which are primarily caused by uterine curettage for postpartum or postabortion residue, there was no discernible difference in the rate of intrauterine adhesions between patients with primary and secondary infertility.

However, compared to women who were fertile, **Shokeir et al. [25]** discovered that these lesions were more common in the population with unexplained infertility. Although follow-up on these women showed improved reproductive results following polypectomy, it is still unclear if these polyps may contribute to infertility. Based on his findings, He concluded that since endometrial polyps, no matter how little, are likely to lower fertility, it makes sense to recommend surgically treating all of them in eumenorrheic infertile women. Removal of these polyps may improve reproductive outcomes.

10% of patients with multiple unsuccessful IVF cycles who had never had an abortion or other uterine treatment experienced intrauterine adhesions, according to **Oliveira et al. [16].** He recommended ruling out alternative sources of intrauterine adhesions.

Additionally, **Wadhwa et al. [8]** discovered that 35.44% (28/79) of women with initial infertility and 35.71% (10/28) of women with secondary infertility had abnormal hysteroscopic results. There was no statistically significant difference between the two groups (P value = 0.839).

The kind of infertility had no discernible impact on the hysteroscopy's ability to diagnose uterine disease in the **Amirian et al., [12]** investigation.

Hysteroscopy is now a simple, reasonably priced outpatient treatment that is considered the gold standard for identifying intrauterine anomalies due to technological advancements and downsizing. Since the benefits of using hysteroscopy in this way are still unknown, hysterosalpingography or hysterosonography should be the basis for the inspection of the uterine cavity in the initial assessment of infertility. The widely accepted procedure of systematic hysteroscopy before IVF is believed to enhance the rate of conception, despite the lack of scientific evidence to support this claim. After many IVF cycle implantation failures, hysteroscopy should be performed to examine the uterine cavity; this procedure has been shown to increase the likelihood of pregnancy **[26].**

Conclusions

Given that uterine disorders, both congenital and acquired, affect roughly 23.3% of women with primary or secondary infertility, our results conclude to the use of diagnostic hysteroscopy in the first routine examination of infertile women. We believe that diagnostic hysteroscopy is equally relevant in the evaluation of patients with primary and secondary infertility when the hysterosalpingeogram is normal, as there was no noticeable difference in the intrauterine results between women with primary and secondary infertility.

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Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interest.

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