

An Analytical Study of Combined Diagnostic Hysteroscopy and Laparoscopy in Evaluating Factors for Infertility

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Abstract

Background: Almost 10-15% of marriages prove to be childless. Infertility is inability of a couple to achieve conception after one year of unprotected coitus. **Aims & Objectives:** To evaluate the role of diagnostic hysteroscopy and laparoscopy in the assessment of primary and secondary infertility and to help in planning appropriate treatment and to study the frequency of various pathological conditions in female reproductive tract leading to infertility. **Materials & Methods:** A prospective study on 205 infertile women of age group 18 to 44 years visiting GMCH, Udaipur from October 2015 to October 2017. Hysterolaparoscopy was performed under general anesthesia in the pre-ovulatory period between days 6-10 of the cycle for infertility evaluation. Routine investigations were performed. Results were tabulated in Microsoft Excel 2013 software and analyzed using SPSS16. **Results:** More primary (61.95%) than secondary infertility (38.05%). Maximum patients in 26-30 years of age in primary and 31-35 years of age in secondary infertility. Uterine septum and fibrosedostea (6.29% each) were main findings in primary whereas uterine polyp/fibroid was the main hysteroscopic finding in the secondary infertility. Endometrium was polypoidal in 4.72%, hyperplastic in 3.93% in the primary, 8.97% and 21.79% in secondary infertility respectively.

Uterine perforation (1.57%) was the complication in the primary and gaseous distension of abdomen (3.84%) in the secondary infertility. Most common pathology was PID (16.08%) followed by fibroid 8.29%, endometriosis 7.8%, PCOD 7.31%, uterine septum, polyp/myoma and hydrosalpinx 6.34%, fibrosed ostea and TO mass 5.36%. **Conclusion:** Female infertility cases especially in whom all tests are normal, endometrial study helps to reduce the unexplained etiological factors in infertility and to know the ovulatory factor. Both laparoscopy and hysteroscopy combined together is a valuable technique for complete assessment of female factors of infertility especially in an symptomatic patient and should be used early in the diagnostic workup.

Keywords: Hysteroscopy; Laparoscopy; Infertility; Hysterolaparoscopy.

Introduction

Almost 10-15% of marriages prove to be childless. Infertility is defined as the inability of a couple to achieve conception after one year of unprotected coitus. Sterility is an absolute state of inability to conceive. Secondary infertility or sterility are the same states developing after an initial phase of fertility.

The proportion of cases of unexplained infertility seen in any clinic depends on the facilities available, varying from 6 to 60 percent, but is usually seen in about 10-20 percent. In any series of infertile marriages, the main aetiological factor is found in the female in about 40 per cent of cases; about 35 per cent of the husbands concerned have some degree of infertility. In 10-20 per cent of

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Received on 26.02.2018,
Accepted on 27.03.2018

cases, a combination of factors operates and the rest have unexplained infertility. In females there can be several factors for infertility, such as: Ovarian; Peritoneal; Tubal; Uterine; Cervical; Vaginal; Coital factors etc. Anxiety and Apprehension: It is commonly believed that a nervous temperament, particularly extreme anxiety to conceive, lowers fertility. The other factors could be occupation and environmental; diet; hormonal contraceptives used earlier may delay in the return of ovulation or in persisting anovulation, while intrauterine devices can cause salpingitis and tubal damage.

A highly fertile couple practising coitus regularly take an average of 6-7 months to achieve a pregnancy, and four out of five women conceive within one year of commencing regular coitus without contraception. Failure to conceive during 12-18 months despite adequate opportunity is therefore always acceptable as justifying full investigation.

A diagnostic hysteroscope consists of an outer sheath through which a distending medium is passed under pressure. Normal saline is by far the most widely used medium, but carbon dioxide is still used by some clinicians, who find it less messy. The telescope, consisting of a lens system and fibre optic illumination bundles, couples tightly to the sheath to prevent leakage of distending medium. For out-patient hysteroscopy, a 3 mm telescope with a 4 mm outer sheath is recommended, whilst for theatre usage generally a larger 4 mm telescope with a 5.5 mm sheath is more used. The use of a video camera attached to the eye piece allows magnification, a comfortable operating position, and demonstration of the intra-uterine findings to trainees and theatre staff, as well as allowing permanent photographic or video images to be made.

The important complications of hysteroscopy include perforation and fluid absorption. Whilst the latter is an important risk in ablation procedures, particularly where glycine or sorbitol are used, the use of normal saline in diagnostic hysteroscopy is unlikely to lead to any electrolyte disturbance, even if there is excessive absorption. Nevertheless, the amount of fluid input and an estimate of outflow should be recorded. If perforation occurs, the hysteroscope should be removed and if there is evidence of appreciable bleeding, laparoscopy should be performed and usually the bleeding can be controlled with diathermy or a suture. If there is insufficient evidence of bleeding to warrant immediate laparoscopy, the patient should be observed for a few hours and prophylactic antibiotics given. Infection as a complication of hysteroscopy is rare, but if during the procedure there is suspicion of cervical or pelvic infection, prophylactic antibiotics may be given.

The establishment of laparoscopy, sometimes known as peritoneoscopy or celioscopy, has been the major advance in diagnostic gynaecology in the latter part of the twentieth century, owing much to the work and writings of Palmer, and Steptoe. Diagnostic speculation can now be replaced by precision and certainty. Nevertheless, it cannot be too strongly emphasised that laparoscopy is a potentially hazardous technique with an appreciable morbidity and even mortality, especially where operative procedures involving the use of intraperitoneal diathermy are concerned.

Any pre-existing cardiovascular or respiratory condition that precludes pneumoperitoneum or the Trendelenburg position should be regarded as a contraindication to laparoscopy. Laparoscopy should only be carried out in the presence of generalized peritonitis, intestinal ileus or obstruction by a highly experienced gynaecologist, who understands how and when to use the Hassan open technique or Palmer's point entry approach.

Hystero-laparoscopy becomes the "Third eye of the gynecologist" in diagnosis of infertility. Frequently, problems that cannot be discovered by an external physical examination can be discovered by laparoscopy and hysteroscopy, two procedures that provide a direct look at the pelvic organs.

These procedures may be recommended as part of infertility care, depending on the particular situation. Laparoscopy and hysteroscopy can be used for both diagnostic and operative purposes. The ability to see and manipulate the uterus, fallopian tubes, and ovaries during laparoscopy has made it an essential part of infertility evaluation. Similarly, visualizing the uterine cavity and identifying the possible pathology has made hysteroscopy an equally important tool in infertility evaluation.

Aims and Objectives

1. To evaluate the role of diagnostic hysteroscopy and laparoscopy in the assessment of primary and secondary infertility and to help in planning appropriate treatment.
2. To study the frequency of various pathological conditions in female reproductive tract leading to infertility.

Materials and Methods

A prospective study was done on 205 infertile women visiting department of Obstetrics and Gynaecology and admitted at Geetanjali Medical

College and Hospital (GMCH), Udaipur from October 2015 to October 2017. All the primary and secondary infertility patients in the age group of 18 to 44 years.

The findings of the procedure was recorded and analysed.

Inclusion criteria: Primary or secondary infertile women, normal husband semen analysis, females with normal thyroid profile and females with normal serum prolactin.

Exclusion Criteria: Females with altered prolactin levels, hyper or hypothyroid women, women with severe cardiac/respiratory illness, acute generalized peritonitis, anesthetic problems, diabetes mellitus, severe anemia, sexually transmitted diseases, severe urinary tract infection and patients refusing consent for surgery.

Hysterolaparoscopy was performed under general anesthesia in the pre ovulatory period between days 6-10 of the cycle for infertility evaluation. Routine investigations such as hemoglobin, blood group, Rh type, VDRL, Random blood sugar (RBS), Urine routine, microscopy, chest X-ray, pelvic ultrasound was done.

The patient was placed in the lithotomy position, the vagina and cervix were cleaned with H₂O₂ betadine and the position of the uterus confirmed by bimanual examination. Painting and draping was done from xiphisternum to mid thigh A Sims' speculum was inserted and a tenaculum or vulsellum forceps applied to the anterior lip of the cervix. A uterine sound was passed to confirm the axis of the uterus. The hysteroscope was then connected to the distension medium and the cervix dilated by hydrodilatation pressure under direct vision. Once the hysteroscope was passed under direct visual control through the cervix, it took a few moments for the whole uterine cavity and fundus to become well distended with normal saline. The uterine cavity was examined for the presence of septum, any congenital malformation, fibrotic bands, polyps, myomas, endometrial appearance, thickness and color. Endocervical canal was visualized for any growth or polyps. Both the tubal ostia were visualized. This was done using a hysteroscope STRYKER 4mm diameter with a 30 degree angle. Endometrial biopsy was obtained by curettage using a sharp curette.

A careful evaluation of the fallopian tubes, ovaries, pelvic peritoneum, pouch of Douglas and peritoneal cavity was done. The features suggestive of infertility was looked for and Chromopertubation was done to see the tubal patency on both the sides. On laparoscopy, pelvic cavity and organs were inspected. Uterus was inspected for its shape, size, position and surface. Cul-de-sac was examined for

any adhesions, obliteration, endometriotic nodules or fluid. Ovaries were viewed for size, shape, surface, color, presence of cysts and relation with tubes. Fallopian tubes were inspected carefully for size, shape, surface, kinking, dilatation, stricture or hydrosalpinx. Laparoscopic chromopertubation was performed for testing tubal patency in which methylene blue dye was injected with a 20ml syringe via Leech Wilkinson cannula and bilateral spillage of dye from the fimbrial end of tube visualized.

Results were tabulated in Microsoft Excel 2013 software and analyzed using SPSS16 software.

Results

There were more cases of primary infertility (127, 61.95%) than secondary infertility (78, 38.05%), which indicates more awareness in younger generation towards infertility. Majority (41.73%) of the patients in the primary infertility group were between 26-30 years of age whereas the majority (42.31%) of patients in secondary infertility group were in 31-35 years of age group (Table 1).

Majority of patients in the primary infertility group were married for >3 years (32.28%) whereas majority of the secondary infertile patients were married for 7-9 years (34.61%) (Figure 1).

The hysteroscopic findings showed that uterine septum (6.29%) and Fibrosedostea (6.29%) were leading findings in primary infertility whereas uterine polyp/ fibroid was the major hysteroscopic finding followed by uterine septum (6.41%) and Synechiae (6.41%) in the secondary infertility group.

Endometrium in the majority of the patients was normal in both the groups but it was polypoidal in 4.72% patients in the primary infertility and 8.97% in secondary group and hyperplastic in 21.79% patients in the secondary infertility group and 3.93% in primary infertility (Table 3). Uterine Fibroid was the only uterine pathology noted on laparoscopy which was 7.87% of total in primary infertility patients and 8.97% in the secondary infertility group.

This table depicts the ovarian findings during laparoscopy. The leading ovarian pathology in both the groups was PCOD (7.87% in primary and 6.41% in secondary followed by ovarian endometriomas the 2nd major finding (3.93% of total in primary and 5.12% in secondary). Tubal Findings of laparoscopy showed a variety of findings of which hydrosalpinx was the leading finding in the primary infertility group and both hydrosalpinx and TO mass (6.41% each) in the secondary infertility group. PID was the major

peritoneal finding in both the groups (13.38% in primary infertility and 20.51% in secondary) but most of the patients with PID had only adhesions as shown in the table. 28.34% of the total patients in the primary infertility group & 23.07% in the secondary infertility group had tubal blockage. 72.22% patients in the primary infertility group had a bilateral tubal block whereas it reduced to 66.66% in the secondary infertility group (Table 4).

Uterine perforation (1.57%) was the leading complication in the primary infertility whereas it was gaseous distension of abdomen (3.84%) in the secondary infertility group (Figure 2).

The most common pathology noted in our study was PID (16.08%) followed by fibroid 8.29%, endometriosis 7.8%, PCOD 7.31%, uterine septum, polyp/myoma and hydrosalpinx 6.34%, fibrosed ostea and TO mass 5.36% (Table 5).

Table 1: Distribution of Infertility According to Age

Age group (years)	Primary infertility		Secondary infertility		Total	
	No.	%	No.	%	No.	%
18-20	9	7.09%	1	1.28%	10	4.88%
21-25	45	35.43%	6	7.69%	51	24.88%
26-30	53	41.73%	16	20.51%	69	33.66%
31-35	19	14.96%	33	42.31%	52	25.37%
≥36	1	0.79%	22	28.21%	23	11.22%
Total	127	61.95%	78	38.05%	205	100%

Table 2: Hysteroscopic Findings

Hysteroscopic Anomaly	Primary infertility		Secondary infertility	
	No.	%	No.	%
Uterine Septum	8	6.29%	5	6.41%
Fibrosed Ostea	8	6.29%	3	3.84%
Polyp/Myoma	6	4.72%	7	8.97%
Synechiae	1	0.78%	5	6.41%
Total	23	18.11%	20	25.64%

Table 3: Endometrium (Abnormal in 17.07% patients)

Findings	Primary infertility		Secondary infertility	
	No.	%	No.	%
Hyperplastic	5	3.93%	17	21.79%
Normal	116	91.33%	54	69.23%
Polypoidal	6	4.72%	7	8.97%
Total	127	-	78	-

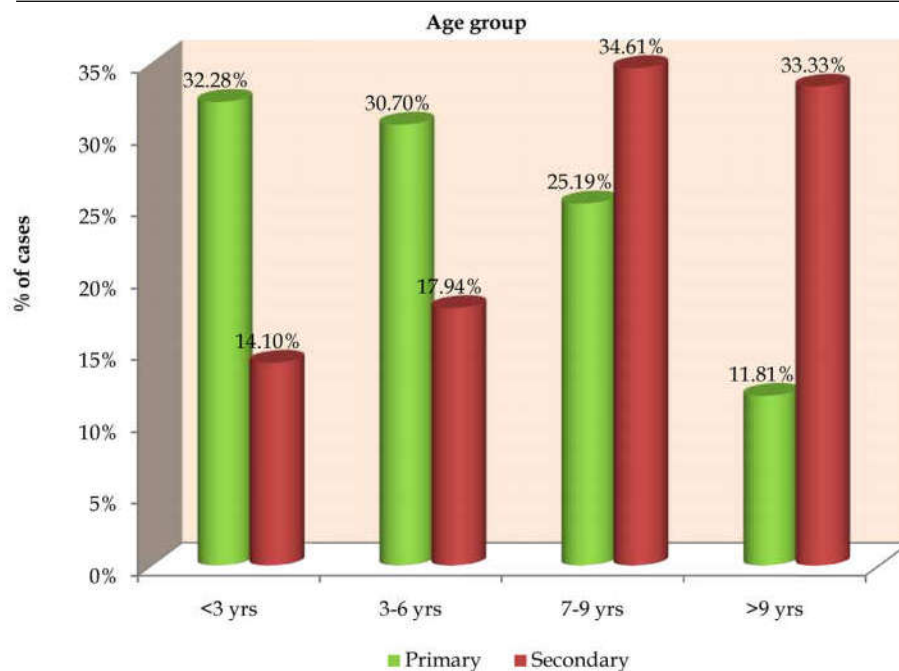


Fig. 1: Distribution according to Marital Life

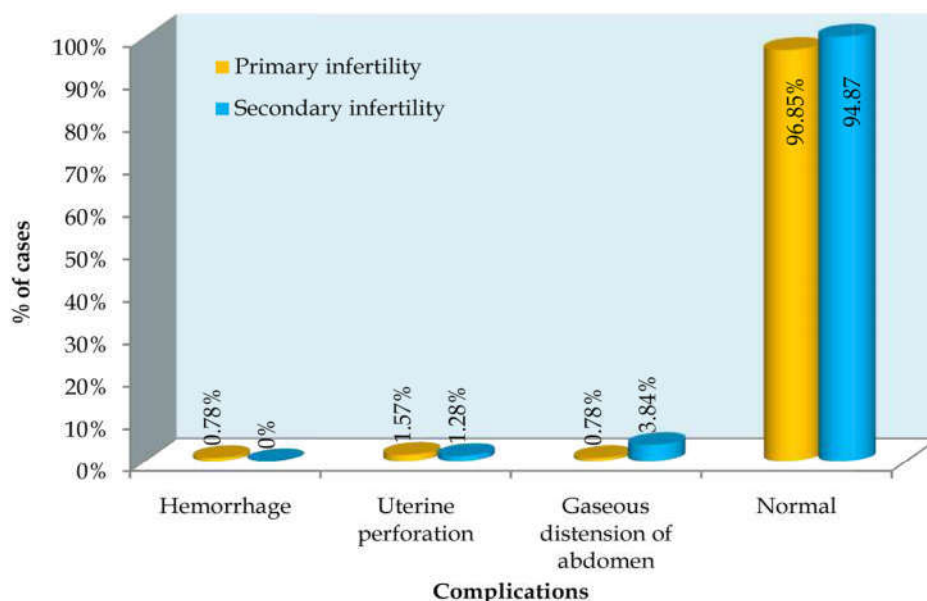


Fig. 2: Complications (in 3.9% patients)

Table 4: Ovaries

Findings	Primary infertility No.	Primary infertility %	Secondary infertility No.	Secondary infertility %
Ovarian Pathology (16.09% of all patients)				
Simple Cyst	3	2.36%	4	5.12%
PCOD	10	7.87%	5	6.41%
Ovarian Endometrioma	5	3.93%	4	5.12%
Atrophied/ Aplastic Ovary	1	0.78%	0	0%
Tubal Findings (19.51%)				
Inflamed	5	3.93%	4	5.12%
Tubercles	4	3.14%	3	3.84%
Hydrosalpinx	8	6.29%	5	6.41%
TO Mass	6	4.72%	5	6.41%
Normal	104	81.88%	61	78.20%
Peritoneum (19.51% of all patients)				
PID Adhesions Only	7	5.51%	8	10.25%
PID Adhesions with TO Mass	6	4.72%	5	6.41%
PID Tubercles with Adhesions	4	3.14%	3	3.84%
Endometriosis	4	3.14%	3	3.84%
Tubal Block (26.34% of all patients)				
Only Tubal Block	21	16.53%	11	14.10%
T Block with Adhesions	3	2.36%	5	6.41%
Tubal Block with TO Mass	10	7.87%	1	1.28%
Tubal Block with endometriosis	2	1.57%	1	1.28%
Tubal Block				
Unilateral	10	27.77%	6	33.33%
Bilateral	26	72.22%	12	66.66%

Table 5: Laparoscopic and Hysteroscopic Findings

Findings	No.	%
PID	33	16.08%
Fibroid	17	8.29%
Endometriosis/ Endometrioma	16	7.8%
PCOD	15	7.31%
Uterine Septum	13	6.34%
Intrauterine polyp/ myoma	13	6.34%
Hydrosalpinx	13	6.34%
Fibrosed Ostea	11	5.36%
TO mass	11	5.36%

Discussion

Infertile women with normal ovulation, normal pelvic ultrasound finding, normal hormonal profile and normal husband semen analysis have higher possibility of having tubo-peritoneal and subtle endometrial pathologies. The subtle changes are better picked up on magnification with hystero-laparoscopy. These women have a lot of emotional and financial trauma on undergoing series of procedures like HSG (hysterosalpingography), laparoscopy and hysteroscopy over a period of time, before being referred for ART (Assisted Reproductive Technique). Performing hystero-laparoscopy as "one step procedure" in these women will be more beneficial.

Intracavitary pathology includes submucous leiomyomas and endometrial polyps, uterine septum, bicornuate uterus. Those pathologies often result in abnormal uterine bleeding, infertility or both. Congenital anomalies of the female reproductive system are associated with higher rate of infertility. Diagnostic laparohysteroscopy offers a reliable evaluation of the pelvic cavity and intrauterine and subsequent detection of diseased state.

There were more number of cases (127, 61.95%) with primary infertility than those of secondary infertility (78, 38.05%) which is quiet similar to various findings by Chimote et al (73%, 27%), Mohapatra et al (60%, 40%), Shah et al (67%, 33%) and Shetty et al (68%, 32%). The majority (41.73%) of the patients in the primary infertility group were between 26-30 years of age indicating that there is increasing awareness among the present generation regarding infertility and the requirement for this condition [3] whereas the majority (42.31%) of patients in secondary infertility group were in 31-35 years of age group. Other studies observed 63% patients of 20-30 years of age group with mean age of 26.5 years [2]. Similarly, a study from Mysore, India showed the mean age of infertility was 28.4 years. Primary infertility rate was much higher (almost twice) in women up to 30 while secondary infertility was more common (1.7 times) in women after age of 30 years⁶. In primary infertility group majority were married for >3 years (32.28%) and 7-9 years (34.61%) in the secondary group.

Ninety One out of 127 patients had abnormal hystero-laparoscopic findings (71.65%) in primary infertility group quiet consistent to the findings those of Ramesh et al [7], who showed 75.6% of abnormal hystero-laparoscopic findings in their study and 74% in Chimote et al [3]. 83.3% had abnormal hystero-laparoscopic findings in our secondary infertility

group, these were also similar to the findings those of (76.5%) Ramesh et al [7]. Diagnostic laparoscopy is the standard means of diagnosing the tubal pathology, peritoneal factors, endometriosis and intra-abdominal causes of infertility [3].

The most common intrauterine pathology in both the groups was uterine septum accounting for about 13.7% and the septate uterus had large fibrous midline septum in its cavity [7], whereas in the present study hysteroscopic findings showed that the uterine septum (6.29%) and fibrosed ostea (6.29%) were leading findings in primary infertility. Uterine polyp/fibroid was the major hysteroscopic finding followed by uterine septum (6.41%) and Synechia (6.41%) in the secondary infertility group. Out of 26 patients having septate uterus, only 6 had complete septum [7]. Next most common intrauterine lesions were endometrial polyp and myoma accounting for about 12.6% (24 out of 190 patients) [7].

Dawle [9] and Mehta et al [8] (2016) stated that the most common intrauterine pathology in primary and secondary infertility groups was uterine septum. Out of 29 patients diagnosed with septate uterus, only one patient had complete uterine septum that falls under the primary infertility group.

Endometrium in the majority of the patients was normal in both the groups but it was polypoidal in 4.72% patients in the primary infertility and 8.97% in secondary group and hyperplastic in 21.79% patients in the secondary infertility group and 3.93% in primary infertility. Shah SJ et al [20] (2014) showed 40% cases of abnormal pathology through hysterectomy such as myomas, endometrial hyperplasia, polyp, adhesions, septum etc. Endometrial polyps were revealed in 5% and Asherman's syndrome in 4% patients on diagnostic hysteroscopy.

Uterine fibroid (7.87%) was the only uterine pathology noted on laparoscopy in primary infertility patients and 8.97% in the secondary infertility group. PCOD was more common in the primary infertility group (7.87%), but endometriosis and uterine septum were almost equal in both the groups which are similar to findings of Mohapatra et al [4].

Hydrosalpinx, tubal blockage, endometrial polyps, Asherman's synechia are more common in the secondary infertility group compared to primary infertility group (5%, 7.5%, 17.5%, 7.5%, 7.5% as against 1.7%, 1.7%, 7%, 3.5% and nil respectively) in our study. These were in congruence with Mohapatra et al [4] (25%, 13%, 10% and 20%, 7.5% and nil respectively).

Godinjak Z et al [10] performed simultaneous laparoscopy and hysteroscopy is 360 infertile cases and found tubal occlusion in 8%, pelvic adhesion in

11%, myomas 11%, Endometrial polyp 7%, Asherman syndrome in 0.8%, uterine anomalies in 5% cases, which were comparable to our study except tubal occlusion. In our study, we have found tubal occlusion in 26.3%, adhesions (PID) in 16.08%, myomas in 8.29%, endometrial polyp in 6.34%, synechiaem 2.9% and uterine anomalies in 6.34%.

Ramesh et al⁷ found that adnexal adhesions and endometriosis 41.6% patients were the most common abnormalities detected in laparoscopy in primary and secondary infertility groups. These findings are comparable to our study as PID (Adhesions) 33 (26.34%), Fibroid 17 (8.29%), Endometriosis 16 (7.8%) and PCOD 15 (7.31%) were the most common pathologies in our study.

In the primary infertility group, 7.07% had endometriosis, 13.3% had adhesions and 4.72% had submucous fibroid/polyp. In the secondary infertility group, 8.96% had endometriosis, 20.75% had adhesions, 6.41% had uterine septum and 8.97% patients had submucous fibroid in the present study.

We observed ovarian pathology of 15.74% in primary infertility which were comparable to the studies by Talib W et al [11] (28%) and Chimote et al [3] (26%). Ovarian factors contributed to 16.09% in our study. This correlates with the study done by Chakraborti et al [12](19.4%) and Chimote et al [3] (22.2%). Of the total ovarian causes, PCOS was seen 11.4% in the studies by Chakraborti et al [12], 19% in the study by Chimote et al [3] and 7.31% in our study which suggests that laparoscopy should be done for these patients as PCOS can be diagnosed as well as treated by laparoscopy. The incidence of endometriosis was 7.8% in the present study, which is in corroboration by the earlier studies by Godinjak Z et al [10] 14% and Parveen S et al [6] 13(8%).

In our study uterine perforation (1.57%) was the leading complication in the primary infertility whereas it was gaseous distension of abdomen (3.84%) in the secondary infertility group. However, all perforation cases were managed conservatively. Mehta et al [8] found gaseous distension of abdomen to be the leading complication of the procedure 6% followed by uterine perforation (2%) and bleeding (1%). Mohapatra et al[4] reported no major complications in their respective studies. These results were comparable to our study.

Conclusion

The procedure along with chromopertubation should be offered in all tertiary health care centers for effective management of female infertility cases

especially in whom all other tests like hormonal assays, routine tests including ESR, Mx, TVS and SIS, HSG and endometrial study have already been done. Endometrial study helps to reduce the unexplained etiological factors in infertility and to know the ovulatory factor.

Though laparoscopy and hysteroscopy are invasive procedure the complications associated with them can be minimized with proper training and hence benefit the patients and gives us a direct view of the pathology.

Both laparoscopy and hysteroscopy combined together is a valuable technique for complete assessment of female factors of infertility especially in an symptomatic patient and should be used early in the diagnostic work up.

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