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Original Research Article

Diagnostic and therapeutic yield of combined hysterolaparoscopy in female infertility: a prospective observational study from Central India

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ABSTRACT

Background: Combined diagnostic hysterolaparoscopy (DHL) permits evaluation of intra uterine and extrauterine causes of infertility and selected corrective procedures during the same sitting. This study evaluated its diagnostic and therapeutic yield in relation to preoperative transvaginal sonography (TVS) and hysterosalpingography (HSG).
Methods: This prospective observational study included 250 consecutive consenting women with infertility who underwent hysteroscopy, laparoscopy, and chromopertubation at a tertiary-care hospital in Central India from 1 March 2024 to 28 February 2025. Direct endoscopic findings were compared with TVS and HSG findings. Appropriate paired and between-group statistical tests were applied.
Results: Primary infertility was present in 159 women (63.6%) and secondary infertility in 91 (36.4%). Combined DHL detected at least one abnormality in 213 women (85.2%), compared with 138 (55.2%) on TVS and 112 (44.8%) on HSG (both $p<0.001$). Hysteroscopy detected intrauterine abnormalities sin 129 women (51.6%) versus 45 (18.0%) on TVS, while laparoscopy detected tubo-pelvic abnormalities in 110 (44.0%) versus 86 (34.4%) on HSG (both $p<0.001$). In unadjusted comparisons, polycystic ovarian morphology and endometriosis/endometrioma were more frequent in primary infertility, while synechiae, hydrosalpinx, tubal pathology, and bilateral tubal block were more frequent in secondary infertility. Same-sitting procedures were performed in 135 women (54.0%).
Conclusions: Combined DHL had a high abnormality-detection yield and led to a same-sitting procedure in 54.0% of selected women. It is best used selectively after non-invasive evaluation, as a complementary, lesion-directed procedure at her than a replacement for first-line imaging.

Keywords: Chromopertubation, Female infertility, Genital tuberculosis, Hysteroscopy, Hysterolaparoscopy, Laparoscopy

INTRODUCTION

Infertility is a major reproductive health problem with medical, psychosocial, and economic consequences for affected couples. The World Health Organization estimates that approximately one in six adults experience infertility during their reproductive lifetime, emphasizing the need for accurate and context-sensitive evaluation pathways.[1] Clinically, infertility is defined as failure to achieve pregnancy after 12 months of regular unprotected inter course; earlier evaluation is recommended after 6 months in women older than 35 years.[2]

Female infertility is usually multifactorial. Ovulatory disorders, uterine cavity abnormalities, endometrial pathology, tubal disease, ovarian lesions, endometriosis, pelvic adhesions, and infective sequelae may coexist. A single screening modality therefore rarely provides a complete explanation. TVS is accessible and useful for ovarian morphology, fibroids, endometrioma, hydrosalpinx, and endometrial thickness; HSG is valuable for screening uterine cavity contour and tubal spill.

However, both are indirect tests and may miss subtle cavity lesions, peri-tubal adhesions, fimbrial pathology, endometriosis, or tubercular pelvic disease.

Combined hysteroscopy and laparoscopy in one sitting, usually described as DHL, directly evaluates the cervical canal, uterine cavity, endometrium, tubal ostia, uterus, ovaries, fallopian tubes, tubo-ovarian relationship, pouch of Douglas, pelvic peritoneum, and tubal patency by chromopertubation. It also allows treatment of correctable lesions such as adhesions, polyps, septa, selected fibroids, endometriotic lesions, ovarian cysts, and selected tubal obstructions during the same procedure.[3,4]

International recommendations remain heterogeneous, especially for women with unexplained infertility or normal preliminary imaging. ESHRE guidance stresses that unexplained infertility is a diagnosis of exclusion and that additional investigations should be individualised.[5] Recent systematic reviews indicate that hysteroscopy may improve reproductive outcomes in selected infertile women, particularly when previously unrecognized intrauterine pathology is identified and treated; however, heterogeneity in patient selection and treatment indications does not support routine use in all women with infertility.[6,7] Studies comparing TVS or HSG with hysteroscopy or laparoscopy likewise show that screening tests remain useful but cannot characterize every intrauterine or tubo-pelvic lesion.[8-11]

The present study was designed to evaluate the diagnostic and therapeutic profile of combined DHL in infertile women attending a tertiary-care infertility clinic in Central India, to compare its diagnostic yield with preoperative TVS and HSG, and to identify differences between primary and secondary infertility patterns.

METHODS

Study design and setting

This was a prospective observational study conducted in the Department of Obstetrics and Gynaecology, R. D. Gardi Medical College and C. R. Gardi Hospital, Surasa, Ujjain, Madhya Pradesh, India.

Study period and population

Data were collected over one year, from 1 March 2024 to 28 February 2025.Thestudy population comprised infertile women attending the in-fertility clinic who were under evaluation for failure to conceive and who consented to undergo combined hysterolaparoscopic evaluation.

Eligibility criteria

Inclusion criteria were: women with infertility attending C.R. Gardi Hospital, willingness to undergo hysterolaparoscopic evaluation, and written informed consent. Exclusion criteria were: unwillingness for further investigations or procedure, male-factor in fertility as the sole cause, previous operative treatment for infertility, active pelvic or genital tract infection, suspected or confirmed pregnancy, confirmed cervical/ endometrial/ adnexal malignancy, unfitness for anaesthesia or laparoscopy, and refusal of consent.

Sample size and sampling

The sample size was calculated using the formula $n=Z^2\times p\times q/d^2$ for estimating a single proportion. Using a 95% confidence level (Z=1.96), anticipated prevalence of significant pelvic pathology of 20%, and absolute precision of 5%, the calculated sample size was 245.86 and was rounded to 250. Consecutive eligible consenting women were enrolled until the desired sample was achieved.

Pre-procedure work-up

All participants underwent structured history taking, menstrual and obstetric history, general and local examination, and routine investigations including complete blood count, liver and renal function tests, random blood sugar, blood group, and infectious disease screening.

Special investigations included TVS, HSG, serum anti-Mullerian hormone (AMH), serum prolactin, thyroid-stimulating hormone (TSH), Mantoux test, and husband semen analysis as applicable. Anaesthesia fitness was assessed according to institutional protocol.

Hysterolaparoscopic procedure

After completion of preliminary investigations, combined DHL was performed in the post-menstrual phase under appropriate anaesthesia. Hysteroscopy was performed first to evaluate the cervical canal, internal os, uterine cavity, endometrium, intracavitary lesions, and both tubal ostia. Laparoscopy was then performed to assess the uterus, ovaries, fallopian tubes, tubo-ovarian relationship, pouch of Douglas, pelvic peritoneum, adhesions, endometriosis, tubercular-appearing lesions, and other pelvic pathology. Tubal patency was assessed by chromopertubation. Corrective procedures were performed in the same sitting wherever feasible and clinically indicated.

Outcomes

The primary outcomes were diagnostic yield, defined as the proportion of women with at least one recorded hysteroscopic or laparoscopic abnormality, and therapeutic yield, defined as the proportion who underwent at least one same-sitting corrective procedure. Secondary outcomes were the pattern of uterine, endometrial, tubal, ovarian, and pelvic-peritoneal findings; differences in major findings between primary and secondary infertility; the association of Mantoux positivity with endoscopic features suggestive of female genital tuberculosis; and

comparison of modality-specific abnormality-detection proportions on TVS, HSG, hysteroscopy, and laparoscopy.

Statistical analysis

Continuous variables were summarized as mean±standard deviation. Categorical variables were summarized as frequencies and percentages. Comparisons between primary and secondary infertility used independent t tests for continuous variables and chi-square or Fisher exact tests for categorical variables.

Paired detection-yield comparisons used McNemar exact test. Risk differences with 95% confidence intervals were calculated for major pathology differences between infertility groups. A two-sided $p<0.05$ was considered statistically significant.

Ethical considerations

The study was initiated after approval by the institutional ethics committee. Written informed consent was obtained from all participants and confidentiality was maintained. Ethics approval number: PG/OBSTETRICS and GYNAECOLOGY/44/2024.

RESULTS

Study cohort and baseline profile

A total of 250 infertile women underwent combined hysterolaparoscopic evaluation. Primary infertility was present in 159 women (63.6%) and secondary infertility in 91 women (36.4%). The mean age was 28.32±2.48 years, mean BMI was 20.66±2.23 kg/m², and mean duration of infertility was 4.78±1.97 years. Mantoux positivity was observed in 21 women (8.4%).

Secondary infertility was associated with older age, longer infertility duration, lower AMH, and higher TSH, while socioeconomic status, residence, and Mantoux status did not differ significantly between infertility groups. The study flow and analytic overview are shown in Figure 1, and the baseline profile is presented in Table 1.

Preoperative TVS and HSG findings

Preoperative TVS was normal in 112 women (44.8%). The most frequent abnormal TVS finding was polycystic ovarian morphology in 50 women (20.0%), followed by submucosal fibroid in 24 (9.6%), hydrosalpinx in 23 (9.2%), thin endometrium in 21 (8.4%), unilateral endometrioma in 19 (7.6%), and suspected adenomyosis in 1 (0.4%).

HSG demonstrated bilateral spill age in 138 women (55.2%); abnormal HSG findings included bilateral tubal block in 38 (15.2%), unilateral tubal block in 26 (10.4%), filling defect in 24 (9.6%), unilateral delayed spilling 22 (8.8%), and suspected septate defect in 2 (0.8%).

Hysteroscopic findings

Hysteroscopy demonstrated a normal uterine cavity in 121 women (48.4%) and abnormal uterine cavity findings in 129 women (51.6%). Intrauterine synechiae were the most frequent abnormality: mild synechiae in 45 women (18.0%) and severe synechiae in 30 women (12.0%).

Submucosal fibroid was found in 24 women (9.6%), while endometrial polyp and septate uterus were each found in 12 women (4.8%). Bilateral ostia were clearly visualized in 186 women (74.4%). Detailed hysteroscopic findings are presented in Table 2.

Laparoscopic findings, chromopertubation profile, and same-sitting intervention

On laparoscopy, a normal uterus was observed in 204 women (81.6%) and normal ovaries in 179 (71.6%). Bilateral normal tubes were observed in 163 women (65.2%).

Pelvis/peritoneum was normal in 140 women (56.0%), while pelvic or peritubal adhesions were identified in 56 (22.4%), endometriotic lesions in 33 (13.2%), and caseous-appearing tubercles with adhesions in21(8.4%). Chromopertubation demonstrated bilateral free spill in 163 women (65.2%).

Diagnostic DHL alone was performed in 115 women (46.0%), while 135 women (54.0%) underwent same-sitting therapeutic intervention, most commonly hysteroscopic adhesiolysis. Laparoscopic findings, chromopertubation results, and principal same-sitting procedures are presented in Table 3.

Key analytical comparisons and diagnostic yield

Major pathology patterns differed by infertility type in unadjusted comparisons. Polycystic ovarian morphology and endometriosis/endometrioma were more frequent in primary infertility, whereas submucosal fibroid, intrauterine synechiae, tubalpathology, hydrosalpinx, and bilateral tubal block/no spill were more frequent in secondary infertility. Mantoux-positive women showed a consistent pattern of endoscopic findings suggestive of female genital tuberculosis.

Combined DHL detected abnormalities in 213 women (85.2%), significantly higher than TVS and HSG, and direct endoscopy had higher intrauterine and tubo-pelvic abnormality yields than the corresponding preoperative modalities. These comparisons describe modality-specific detection proportions rather than diagnostic sensitivity. The principal analytical comparisons are presented in Table 4.

Absolute proportion differences by infertility type are shown in Figure 2, and modality-specific detection yields with 95% confidence intervals are shown in the Figure 3.

Table 1: Baseline demographic, clinical, and hormonal profile by infertility type, (n=250).

Variables	Category/ statistic	Primary, (n=159)	Secondary, (n=91)	Overall, (n=250)	P value
Age (in years)	Mean±SD	26.86±1.74	30.88±1.15	28.32±2.48	<0.001
BMI (kg/m²)	Mean±SD	20.27±2.51	21.36±1.39	20.66±2.23	<0.001
Duration of infertility (years)	Mean±SD	3.60±1.25	6.84±1.13	4.78±1.97	<0.001
AMH (ng/ml)	Mean±SD	4.92±1.37	2.29±0.88	3.97±1.76	<0.001
TSH (mIU/l)	Mean±SD	2.36±0.26	3.12±0.23	2.63±0.44	<0.001
Prolactin (ng/ml)	Mean±SD	16.13±3.06	14.93±1.53	15.70±2.67	<0.001
Age group (in years)	<25	19 (11.9%)	0 (0.0%)	19 (7.6%)	<0.001
	25-29	136 (85.5%)	7 (7.7%)	143 (57.2%)	
	30-34	4 (2.5%)	84 (92.3%)	88 (35.2%)	
BMI category (Asian cut-offs)	Underweight	40 (25.2%)	0 (0.0%)	40 (16.0%)	<0.001
	Normal	91 (57.2%)	84 (92.3%)	175 (70.0%)	
	Overweight	15 (9.4%)	4 (4.4%)	19 (7.6%)	
	Obese	13 (8.2%)	3 (3.3%)	16 (6.4%)	
Socioeconomic status	Lower middle	75 (47.2%)	43 (47.3%)	118 (47.2%)	1.000
	Upper lower	84 (52.8%)	48 (52.7%)	132 (52.8%)	
Residence	Rural	110 (69.2%)	57 (62.6%)	167 (66.8%)	0.329
	Urban	49 (30.8%)	34 (37.4%)	83 (33.2%)	
Mantoux status	Negative	149 (93.7%)	80 (87.9%)	229 (91.6%)	0.154
	Positive	10 (6.3%)	11 (12.1%)	21 (8.4%)	

*Data are presented as mean±SD or N (%). p values compare primary and secondary infertilityusingtheindependentttestforcontinuousvariablesandthechi-squareorFisher exact test for categorical variables, as appropriate. AMH, anti-Müllerian hormone; BMI, body mass index; SD, standard deviation; TSH, thyroid-stimulating hormone.

Table 2: Hysteroscopic findings in infertile women, (n=250).

Findings	Primary, (n=159)	Secondary, (n=91)	Overall, (n=250)
Cervix			
Healthy	153 (96.2%)	79 (86.8%)	232 (92.8%)
Stenosed	6 (3.8%)	12 (13.2%)	18 (7.2%)
Uterine cavity			
Normal	114 (71.7%)	7 (7.7%)	121 (48.4%)
Mild synechiae	6 (3.8%)	39 (42.9%)	45 (18.0%)
Severe synechiae	10 (6.3%)	20 (22.0%)	30 (12.0%)
Submucosal fibroid	3 (1.9%)	21 (23.1%)	24 (9.6%)
Endometrial polyp	10 (6.3%)	2 (2.2%)	12 (4.8%)
Septate uterus	10 (6.3%)	2 (2.2%)	12 (4.8%)
Arcuate uterus	6 (3.8%)	0 (0.0%)	6 (2.4%)
Endometrium			
Proliferative	45 (28.3%)	45 (49.5%)	90 (36.0%)
Secretory	57 (35.8%)	6 (6.6%)	63 (25.2%)
Hyperplastic-appearing	47 (29.6%)	3 (3.3%)	50 (20.0%)
Pale thin	0 (0.0%)	26 (28.6%)	26 (10.4%)
Pale atrophic	10 (6.3%)	11 (12.1%)	21 (8.4%)
Tubal ostia			
Bilateral ostia seen	148 (93.1%)	38 (41.8%)	186 (74.4%)
Bilateral ostia partially seen/ obliterated	5 (3.1%)	23 (25.3%)	28 (11.2%)
Bilateral ostia not visualized	5 (3.1%)	5 (5.5%)	10 (4.0%)
Unilateral ostium partially seen/ obliterated	1 (0.6%)	15 (16.5%)	16 (6.4%)
Unilateral ostium not seen	0 (0.0%)	10 (11.0%)	10 (4.0%)

*Values are N (%). Findings within each anatomical domain are mutually exclusive. Ostia, tubal ostia.

Table 3: Laparoscopic findings, chromopertubation profile, and principal procedure, (n=250).

Finding/ procedure	Primary, (n=159)	Secondary, (n=91)	Overall, (n=250)
Uterus			
Normal	146 (91.8%)	58 (63.7%)	204 (81.6%)
Bulky/fibroid uterus	3 (1.9%)	22 (24.2%)	25 (10.0%)
Small rigid uterus	10 (6.3%)	11 (12.1%)	21 (8.4%)
Ovaries			
Normal ovaries	93 (58.5%)	86 (94.5%)	179 (71.6%)
Polycystic ovarian morphology	47 (29.6%)	3 (3.3%)	50 (20.0%)
Unilateral endometrioma	19 (11.9%)	2 (2.2%)	21 (8.4%)
Tubes			
Bilateral tubes normal	128 (80.5%)	35 (38.5%)	163 (65.2%)
Unilateral peritubal/ perifimbrial adhesions	20 (12.6%)	2 (2.2%)	22 (8.8%)
Beaded rigid bilateral tubes	10 (6.3%)	11 (12.1%)	21 (8.4%)
Bilateral hydrosalpinx	0 (0.0%)	13 (14.3%)	13 (5.2%)
Unilateral fimbrial phimosis	0 (0.0%)	11 (12.1%)	11 (4.4%)
Unilateral hydrosalpinx	1 (0.6%)	9 (9.9%)	10 (4.0%)
Unilateral cornual/proximal block	0 (0.0%)	6 (6.6%)	6 (2.4%)
Bilateral fimbrial phimosis	0 (0.0%)	4 (4.4%)	4 (1.6%)
Pelvis/peritoneum			
Normal	112 (70.4%)	28 (30.8%)	140 (56.0%)
Pelvic/peritubal adhesions	7 (4.4%)	49 (53.8%)	56 (22.4%)
Endometriotic lesions	30 (18.9%)	3 (3.3%)	33 (13.2%)
Caseous-appearing tubercles with adhesions	10 (6.3%)	11 (12.1%)	21 (8.4%)
Chromo pertubation			
Bilateral free spill	128 (80.5%)	35 (38.5%)	163 (65.2%)
Bilateral no spill/block	10 (6.3%)	28 (30.8%)	38 (15.2%)
Finding/procedure			
Unilateral no spill/block	1 (0.6%)	26 (28.6%)	27 (10.8%)
Unilateral delayed spill	20 (12.6%)	2 (2.2%)	22 (8.8%)
Principal procedure			
Diagnostic hysteron laparoscopy only	100 (62.9%)	15 (16.5%)	115 (46.0%)
Hysteroscopic adhesiolysis	6 (3.8%)	48 (52.7%)	54 (21.6%)
Laparoscopic cystectomy	19 (11.9%)	8 (8.8%)	27 (10.8%)
Hysteroscopic polypectomy	10 (6.3%)	8 (8.8%)	18 (7.2%)
Hysteroscopic septal resection	10 (6.3%)	2 (2.2%)	12 (4.8%)
Laparoscopic endometriosis fulguration	11 (6.9%)	1 (1.1%)	12 (4.8%)
Hysteroscopic myomectomy	3 (1.9%)	8 (8.8%)	11 (4.4%)
Laparoscopic tubal cannulation	0 (0.0%)	1 (1.1%)	1 (0.4%)

*Values are N (%). Findings within each anatomical domain are presented as the recorded principal finding. Procedure categories are there corded principal procedures; a procedure may have addressed a concomitant lesion not represented as the principal finding.

Table 4: Comparisons by infertility type, Mantoux status, and detection yield.

Finding/outcome	Comparator A	Comparator B	P value
Major pathology by infertility type			
Polycystic ovarian morphology	Primary: 47 (29.6%)	Secondary: 3 (3.3%)	<0.001
Endometriosis/ endometrioma	Primary: 30 (18.9%)	Secondary: 3 (3.3%)	<0.001
Submucosal fibroid	Primary: 3 (1.9%)	Secondary: 21 (23.1%)	<0.001
Endometrial polyp	Primary: 10 (6.3%)	Secondary: 2 (2.2%)	0.220
Septate uterus	Primary: 10 (6.3%)	Secondary: 2 (2.2%)	0.220
Intrauterine synechiae	Primary: 16 (10.1%)	Secondary: 59 (64.8%)	<0.001
Anytubal pathology	Primary: 31 (19.5%)	Secondary: 56 (61.5%)	<0.001
Hydrosalpinx	Primary: 1 (0.6%)	Secondary: 22 (24.2%)	<0.001
Bilateral tubal block/no spill	Primary: 10 (6.3%)	Secondary: 28 (30.8%)	<0.001

Continued.

Finding/outcome	Comparator A	Comparator B	P value
Endoscopic findings by Mantoux status			
Severe intrauterine synechiae	Mantoux negative: 9 (3.9%)	Mantoux positive: 21 (100%)	<0.001
Pale atrophic endometrium	Mantoux negative: 0 (0.0%)	Mantoux positive: 21 (100%)	<0.001
Beaded rigid bilateral tubes	Mantoux negative: 0 (0.0%)	Mantoux positive: 21 (100%)	<0.001
Caseous-appearing pelvic/ peritoneal lesions	Mantoux negative: 0 (0.0%)	Mantoux positive: 21 (100%)	<0.001
Bilateral tubal block/no spill	Mantoux negative: 17 (7.4%)	Mantoux positive: 21 (100%)	<0.001
Modality-specific detection yield			
Any abnormality detected	TVS: 138 (55.2%; 95% CI 49.0-61.2)	Combined DHL: 213 (85.2%; 95% CI 80.3-89.1)	<0.001
Any abnormality detected	HSG: 112 (44.8%; 95% CI 38.8-51.0)	Combined DHL: 213 (85.2%; 95% CI 80.3-89.1)	<0.001
Finding/outcome			
Intrauterine abnormality detected	TVS:45(18.0%; 95% CI 13.7-23.2)	Hysteroscopy: 129 (51.6%; 95% CI 45.4-57.7)	<0.001
Tubo-pelvic abnormality detected	HSG:86 (34.4%; 95% CI 28.8-40.5)	Laparoscopy: 110 (44.0%; 95% CI 38.0-50.2)	<0.001

*P values for infertility-type and Mantoux comparisons were obtained using the chi-square or Fisher exact test; paired detection-yield comparisons used the Mc Nemar exact test. CI, confidence interval; DHL, diagnostic hysterolaparoscopy; HSG, hysterosalpingography; TVS, transvaginal sonography.

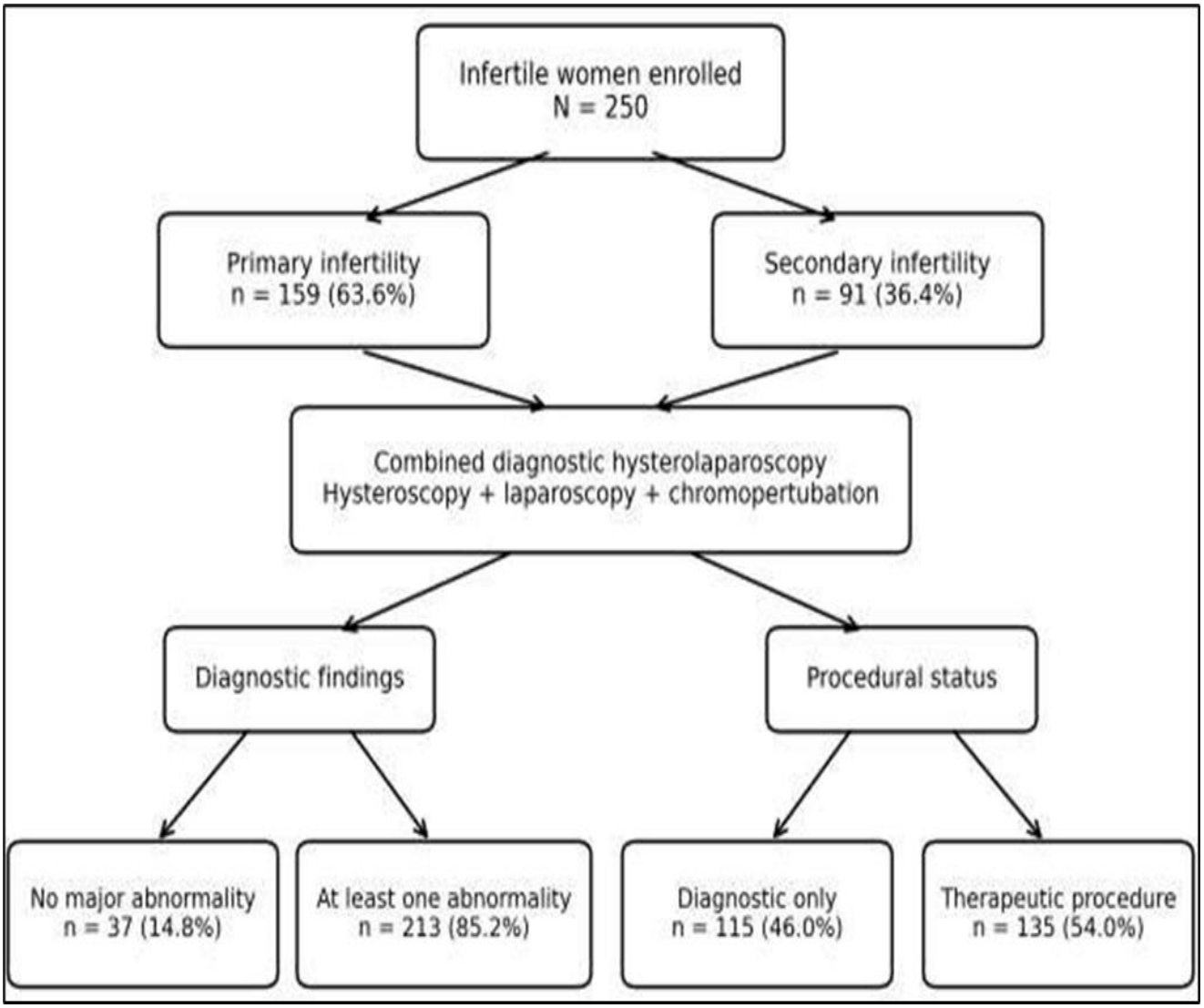

Figure 1: Study flow and analytic overview of the combined hysterolaparoscopy cohort.

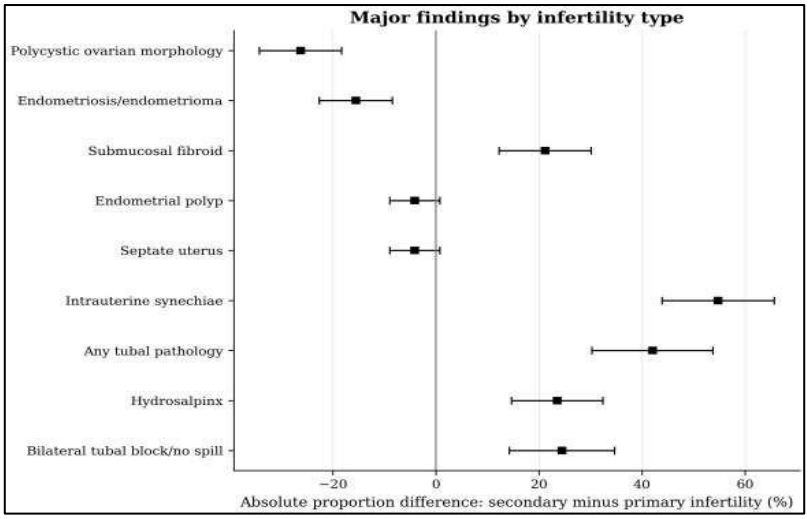

Figure 2: Absolute proportion differences for major hysterolaparoscopic pathologies by infertility type.

*Squares indicate proportion differences and horizontal bars indicate 95% confidence intervals. Negative values indicate findings more frequent in primary infertility; positive values indicate findings more frequent in secondary infertility.

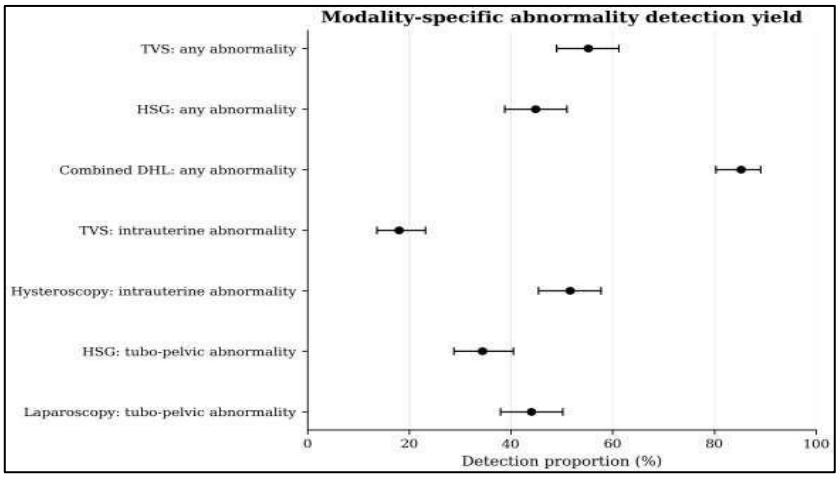

Figure 3: Detection yield of preoperative imaging versus direct endoscopic evaluation.

*Points indicate detection proportions and horizontal bars indicate Wilson 95% confidence intervals.

DISCUSSION

This prospective observational study found that combined DHL had a high abnormality-detection yield and frequently led to a same-sitting corrective procedure among women selected for endoscopic infertility evaluation at a tertiary-care centre. At least one abnormality was identified in 85.2%, compared with abnormalities recorded on preoperative TVS in 55.2% and HSG in 44.8%. These proportions reflect the different anatomical domains assessed and should not be interpreted as direct evidence of diagnostic superiority over imaging. Direct inspection of the uterine cavity, tubalostia, tubes, ovaries, pelvic peritoneum, and tubo-ovarian relationship can nevertheless add clinically relevant information when initial assessment is incomplete or discordant.

The primary/secondary infertility distribution was consistent with Indian hysterolaparoscopy literature. Ramesh and Kurkuri studied 250 infertile women and reported primary infertility in 66.0% and secondary infertility in 34.0%, closely matching the present distribution of 63.6% and 36.4%.[12] Nayak et al reported primary infertility in 69.0% of a 300-patient DHL cohort.[13] Chanu et al also observed a primary-infertility predominance but noted more abnormal findings in secondary infertility.[14] This pattern is biologically plausible because secondary infertility may follow pregnancy-related instrumentation, infection, pelvic inflammatory sequelae, or tubal injury, whereas primary infertility more often includes ovulatory factors, congenital anomalies, or endometriosis.

The hysteroscopic profile in the present cohort was notable for a high burden of intrauterine synechiae. Synechiae were detected in 30.0% overall and in 64.8% of women with secondary infertility, far exceeding the 4.93% synechiae rate reported by Sahu et al in a prospective

hysteroscopy series.[15] However, Chanu et al also identified uterine synechiae as a common hysteroscopic abnormality in a tertiary-care infertility population.[14] The present synechiae-dominant pattern may reflect referral mix, prior reproductive events, and local infective burden, particularly given the severe endoscopic pattern seen in Mantoux-positive women.

Laparoscopy added important diagnostic information by identifying tubal disease, peritubal adhesions, hydrosalpinx, endometriosis, and tubercular-appearing pelvic lesions. This is consistent with the one-step rationale described by Varlas et al and the prospective findings of Sharma et al who reported that combined hysteroscopy and laparoscopy improve diagnostic accuracy and allows therapeutic treatment during the same setting.[3,4] The current study also aligns with Nayak et al who observed endometriosis as an important laparoscopic finding in primary infertility and adhesions as more frequent in secondary infertility.[13]

In the present study, hysteroscopy and laparoscopy had higher modality-specific abnormality-detection proportions than the corresponding preoperative modalities. These differences should not be interpreted as gains in sensitivity or as evidence that imaging can be omitted, because the tests assess partly different anatomical compartments. The findings instead support a complementary sequence in which TVS and HSG guide initial assessment and DHL is reserved for women who require direct cavity or pelvic evaluation.

Polycystic ovarian morphology and endometriotic findings were more frequent in women with primary infertility in the unadjusted comparisons. Polycystic ovarian morphology should not, however, be equated with polycystic ovary syndrome or ovulatory dysfunction, which require clinical and biochemical correlation. Decisions regarding endometriosis surgery should likewise account for disease extent, symptoms, age, and ovarian reserve.[16] These observations favour individualized post-DHL management rather than a uniform treatment pathway.

In unadjusted comparisons, women with secondary infertility had a higher frequency of acquired uterine and tubal pathology. Intrauterine synechiae, submucosal fibroid, any tubal pathology, hydrosalpinx, and bilateral tubal block/no spill were more common in secondary infertility. These findings have clinical relevance: mild adhesions, polyps, septa, and selected fibroids may be corrected hysteroscopically; hydrosalpinx, dense adhesions, fimbrial pathology, or bilateral tubal block may require advanced counselling regarding surgical feasibility and assisted reproduction. Office selective chromopertubation can be used in selected settings to assess tubal patency.[17] It does not, however, assess extraluminal pelvic disease.

The Mantoux-positive sub group requires careful interpretation. All Mantoux-positive women had severe intrauterine synechiae, pale atrophic endometrium, beaded rigid bilateral tubes, caseous-appearing pelvic/peritoneal lesions, and bilateral no spill/block. These findings are strongly suggestive of female genital tuberculosis in an endemic setting, but Mantoux positivity is not confirmatory. Harzif et al emphasized therole of hysteroscopy in evaluating endometrial damage and prognosis in female genital tuberculosis, while Grace et al stressed that microbiological and histopathological confirmation remain important whenever possible.[18-20] The present results therefore highlight the value of DHL for recognizing a severe endoscopic pattern suggestive of female genital tuberculosis, but they should not be interpreted as a microbiologically confirmed prevalence estimate.

Recent systematic reviews and contemporary infertility literature indicate that hysteroscopy may improve reproductive outcomes in selected women, but effects vary with base line cavity findings and the indication for treatment.[6,7,21-24] A 2024 tertiary-care series in this journal also reported tubal infertility and endometriosis among the leading abnormalities identified by combined hysteroscopy and laparoscopy, although its retrospective design and subsequent treatment pathways limit direct comparison with the present cohort.[25] In this study, the 54.0% same-sitting intervention rate represents procedural yield; without pregnancy or live-birth follow-up, it should not be interpreted as evidence of improved reproductive outcome.

Completing an indicated diagnostic and corrective procedure during one anaesthetic episode may nevertheless streamline care when patient selection is appropriate.

Strengths

The study included an adequate sample of 250 consecutively enrolled infertile women and evaluated both primary and secondary infertility using a uniform combined hysteroscopic and laparoscopic approach. The same cohort underwent assessment of cervix, uterine cavity, endometrium, tubal ostia, uterus, ovaries, tubes, pelvis, peritoneum, and tubal patency, enabling a full anatomic profile.

Clinical implications

The findings support selective use of combined DHL after initial infertility assessment, particularly when TVS or HSG findings are abnormal or discordant, or when uterine-cavity, tubal, endometriotic, adhesive, or tubercular pelvic pathology remains clinically suspected. Imaging remains the first-line screening and planning approach; direct endoscopic evaluation may then refine the anatomical diagnosis and permit a same-sitting procedure for selected lesions. Subsequent management should integrate age, ovarian reserve, male-factor evaluation, duration of

infertility, and the complete clinical profile.

Limitations

The study was conducted at a single tertiary-care centre and may reflect local referral patterns and regional disease burden. Long-term reproductive outcomes, including spontaneous conception, clinical pregnancy, live birth, and recurrence of adhesions, were not available in the present analysis. The diagnostic-yield comparison evaluates abnormality detection rather than full sensitivity/ specificity against a universal gold standard. Finally, the endoscopic pattern suggestive of female genital tuberculosis was based on Mantoux positivity and endoscopic appearance; systematic microbiological or histo pathological confirmation was not incorporated into the comparative dataset. Because no multivariable adjustment was performed despite baseline differences between infertility groups, the group comparisons should be interpreted as descriptive associations. Selection at a tertiary-care referral centre may also limit general ability.

CONCLUSION

Among 250 women selected for DHL at a tertiary-care centre, 85.2% had at least one recorded abnormality and 54.0% underwent a same-sitting procedure. Primary and secondary infertility showed different unadjusted patterns of uterine, ovarian, and tubal findings, while Mantoux-positive women had an endoscopic pattern suggestive, but not diagnostic, of female genital tuberculosis. This study adds prospective evidence from Central India that the principal contribution of combined hysterolaparoscopy is the joint assessment of uterine and pelvic compartments with the option of an indicated procedure in the same sitting. Its use should remain selective after non-invasive evaluation, and these findings should not be interpreted as evidence of diagnostic superiority or improved pregnancy or live-birth outcomes.

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