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RESEARCH ARTICLE

THE ROLE OF HYSTEROLAPAROSCOPY OVER HYSTEROSALPINGOGRAPHY IN THE EVALUATION AND MANAGEMENT OF FEMALE INFERTILITY: A DIAGNOSTIC-CUM FERTILITY ENHANCING THERAPEUTIC TOOL

Ketaki K. Junnare[1], Gulab Singh Shekhawat[2], Sonali Ingole[3] and Milind Sintre[4]

1. Professor, Department of Obstetrics & Gynecology, Smt. KashibaiNavale Medical College, Narhe, Pune-411041(Maharashtra).
2. Professor& HOD, Department of Obstetrics & Gynecology, Smt. Kashibai Navale Medical College, Narhe, Pune-411041(Maharashtra).
3. Associate Professor, Department of Obstetrics & Gynecology, Smt. Kashibai Navale Medical College, Narhe, Pune-411041(Maharashtra).
4. Resident, Department of Obstetrics & Gynecology, Smt. Kashibai Navale Medical College, Narhe, Pune-411041(Maharashtra).

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Abstract

Background and objective: The technological advancement in endoscopic instruments has revolutionized the management of female infertility. Our objective was to compare the diagnostic and therapeutic efficacy of Hysterolaparoscopy over Hysterosalpingography in infertile patients and also to assess is there any needfor doing HSG ininfertility evaluation.

Methods:100 infertile women who wereconfirmed to have normal ovulatory cycles, hormonal assays, and husband semen analysis were enrolled.HSG was performed as a basic test for the evaluation of tubes and the uterine cavity. All 100 women were also subjected to combine laparoscopic and hysteroscopy, and comparative evaluation done.

Results:A total of 100 subjects were analyzed in this study. 81% of subjects had primary infertility and 19% had secondary infertility. 89%of patients had normal uterine cavity on HSG whereas 19 % patients had abnormal findings on Hysteroscopy. Hysteroscopy operative procedureswere done among 21% cases.In our study, 40 % patients had abnormal findings on laparoscopy, and corrective surgeries were performed in 23 % patients in the same setting. Laparoscopic operative procedures involved adhesiolysis in 7.0% of cases, PCOD ovarian drilling in 6.0% of patients, myomectomy in 2.0% of cases, Tubal reconstructive surgery in 2.0% of cases, ovarian cystectomy in2.0%of cases and ablation for endometriosis was done in eight (8.0%) cases.

Conclusion: See and treat the infertility factors shall be the reality and future argument in modern Gynecology within the limitations of this study. We conclude that hysterolaparoscopy should be offered as the first- line gold standard modality for the evaluation of infertility wherever the procedure is available.

Corresponding Author:- Ketaki K. Junnare
Address**:-** Professor, Department of Obstetrics & Gynecology, Smt. KashibaiNavale Medical College, Narhe, Pune-411041(Maharashtra).

Introduction:-

Infertility is defined as an inability to conceive after 1 year of unprotected intercourse[1].Infertility is common and affects 10-15% of reproductive-aged couples and may cause negative psychological and social consequences for the couple[2]. Experience has shown that the majority of pelvic pathology in infertile women is not well appreciated by routine pelvic examination and usual diagnostic procedures like ultrasound[3]

Hysterolaparoscopy has been considered the "Third eye of the gynecologist" in diagnosing infertility. Laparoscopy reveals abnormal pelvic findings in 21.68% of cases after normal HSG[4]. Hysteroscopy and laparoscopy can be combined to detect causes of infertility and treat any pathology in the same sitting. The present study evaluates the role of diagnostic hysterolaparoscopy in theevaluation and treatmentof primary and secondary infertility. Operative hysteroscopy techniques are useful for diagnosis and simultaneousoperative procedures likeadhesiolysis, septum resection, and polypectomies[5]. Laparoscopy also becomes a powerful tool as fertility enhancing surgeries for endometriosis, adhesions, and uterine fibroids[6]. HSG is a relatively cheap outpatient procedure, but hasa risk of radiation exposure, whereas laparohysteroscopy is an invasive operativeprocedure,which needs anesthesia. The objective of this study was to assess the role of hysterolaparoscopy over HSG in the comprehensive workup of infertility so as to implement an early appropriate management plan.

Methodology:-

This study was a prospective observational study conducted over 2 years at Smt.KashibaiNavale Medical College, Pune-411041. The medical ethics committee of the Institute approved this study.100 infertile women who were confirmed to have normal ovulatory cycles, hormonal assays, and husband semen analysis were enrolled. Those who were suffering from the severe cardio respiratorydisease, allergic to the HSGdye, theacute pelvic inflammatory disease were excluded from our study. HSG was done on day 7-9 of menses using Leech-Wilkinson's cannula with "Iohexol dye" (trade name Omnipaque). An HSG was considered as normal if the following criteria were fulfilled: no evidence of the tubal block; normality of the uterine cavity; free bilateral spillage of contrast; normal fallopian tube contour [Figure-1]. HSG was not fulfilling criteria that were considered abnormal [Figure 2, 3].All 100 women also underwent hysterolaparoscopic evaluation to diagnose and instantly treat any visible pathology.

The 4-mm rigid hysteroscope with the 5-mm diagnostic or 7-mm operative sheath, normal saline and glycine distension media, tungsten light source generator along Monopolar and bipolar cautery was used in hysteroscopic procedures in our study.Operative intervention including polypectomy, septum resection,and hysteroscopy tubal canalization was done in indicated cases [Figure 4-6].

In laparoscopy a 0 degree or 30-degree telescope, CO2 pneumoperitoneum at 14 mm of Hg with thesecondary port of 6.5 mm was used.Chromopertubation was done by instilling methylene blue dye in all cases. If there was no pelvic adhesion and both fallopian tubes were patent, the diagnosis was normal [Figure 7-9], otherwise specific diagnosis of a tubal block,endometriosis, ovarian cyst, PCOD, pelvic adhesionswererecorded and operative interventions done as "see and treat the approach" for fertility enhancement in the same sittings [Figure 10-12].

Statistical Analysis

We used IBM SPSS Statistics for Windows, Version 26.0 to conduct statistical analysis. Chi-square or Fisher's exact probability method was used to comparingdifferences between groups. $P < 0.05$ was considered statisticallysignificant.Cohen's kappa coefficient analysis wasused to evaluate the consistency of the research methodology.

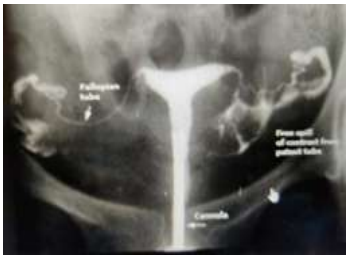
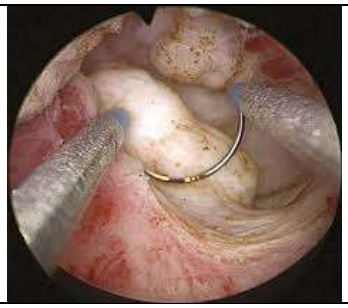


Figure 1-Normal HSG	Figure2-Bicornuate Uterus in HSG	Figure3-Unicornuate Uterus in HSG

		
Figure 4-HysteroscopyCannulation	Figure 5-Hysteroscopy uterine septum resection	Figure 6-Hysteroscopy polypectomy

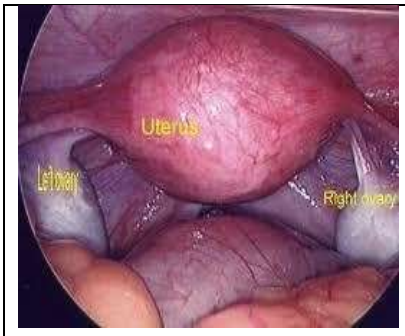
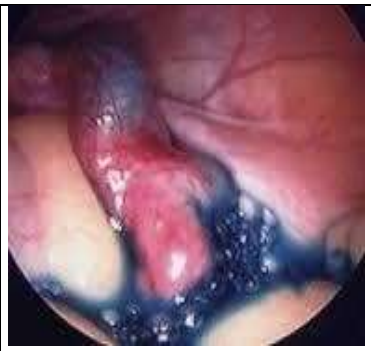
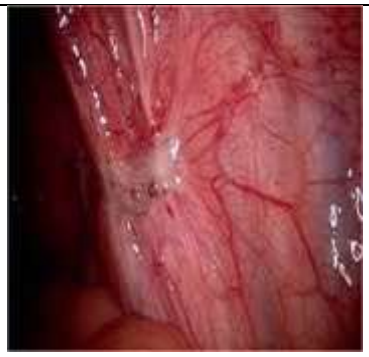
		

Figure7-Normal Laparoscopy	Figure 8-Chromotubation positive with Methylene blue	Figure 9- Endometriosis spots

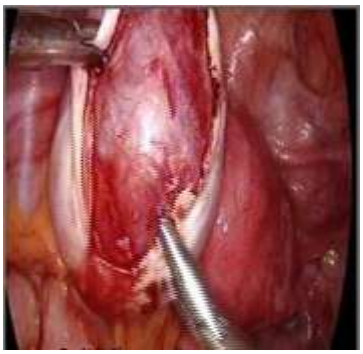
		

Figure 10-Laparoscopic cyst removal	Figure 11- Ovarian drilling in PCOD	Figure12-Laparoscopic Adhesiolysis

Results and Observations:-

A total of 100 subjects were analyzed in this study. 81% of subjects had primary infertility, and 19% had secondary infertility. The average age and BMI of women in our study were 26.50 ±3.52 years and 24.91 ±4.70 Kg/m^2, respectively. The mean duration of infertility was 3.25 ±1.64 years. These baseline characteristics are presented in Table 1:

Table 1:- Baseline parameters of number of patients, age. BMI, duration of Infertility.

Type of infertility	**Primary infertility**	**Secondary infertility**	**P-value**	**Total cases**
Number of patients	81	19	-	100
Age(years), mean ±SD	25.44±3.21	27.56±3.84	0.0001	**26.50±3.52**
BMI(Kg/m^2), mean ±SD	24.26±4.76	25.56±4.64	0.1452	**24.91±4.70**
Duration of infertility(years), Mean ±SD	2.66±1.54	3.84±1.74	0.5382	**3.25±1.64**

(SD: standard deviation; BMI: body mass index)

Regarding the uterine cavity findings, HSG was normal in 89 (89%) women and abnormal in 11 (11%) women; 81 (81%) women were found to have normal hysteroscopy findings and 19 women (19) had abnormal hysteroscopy findings. A summary of the hysteroscopy and HSG findings are presented in Table- 2.

Table 2:- Evaluation of uterine cavity by HSG and hysteroscopy.

HSG findings	**Number of patients (n=100)**	**Percentage (%)**	**Hysteroscopy findings**	**Number of patients (n=100)**	**Percentage (%)**
Normal	89	89	Normal cavity	81	81
Tubal block	11	11	Abnormal	19	19
Filling defects	07	07	Complete uterine septum	04	04
Bicornuate uterus	03	03	Asherman's syndrome	02	02
Uterine Septum	01	01	Endometrial polyp	04	04
			Unicornuate Uterus	01	01
			Sub mucosal fibroid	6	6
			Endo cervical polyp	2	2
Total	100	100	Total	100	100

The comparison of uterine cavity findings on HSG and hysteroscopy is shown in Table 3. The sensitivity, specificity, positive predictive value and negative predictive value were 36.84 %, 95.06 %, 63.63 % and 86.5 % respectively. The agreement between HSG and hysteroscopy was 84 %. Cohen's Kappa value is 0.380. The strength of agreement between HSG and hysteroscopy for uterine cavity findings is considered to be fair.

Table 3:- Comparison of uterine cavity findings on HSG and hysteroscopy.

		Uterine cavity on hysteroscopy		Total	p-value	Kappa value
		Abnormal	Normal			
Uterine cavity findings on HSG	Abnormal	07(TP)	04 (FP)	11	0.003	0.380
	Normal	12(FN)	77(TN)	89		
Total		19	81			

A summary of the laparoscopic findings is presented in Table 4. Out of 100 cases studied, 60 (60.0%) had normal laparoscopic findings. The tubal block was detected in six women of whom two patients had hydrosalpinx. It was found that two (2.0%) had tubo ovarian mass, eight (8.0%) had endometriosis, seven (7.0%) had peri tubal adhesions, two (2.0%) had tubercular spots. We also detected ovarian cyst in two (2.0%) cases, PCOD in nine (9.0%) cases and uterine fibroids among four (4.0%) patients.

Table 4:- Diagnostic laparoscopy findings.

Laparoscopic findings	**No. of cases**	**% Of cases**
Normal	60	60.0
Tubal block	6	6.0
Tubo ovarian mass	2	2.0
Endometriosis	8	8.0
Peri tubal adhesions	7	7.0
Tuberculosis	2	2.0
Ovarian Cyst	2	2.0
PCOS(Polycystic ovarian disease)	9	9.0
Uterine fibroid	4	4.0
Total	**100**	**100**

The comparison of tubal status on HSG and diagnostic hysterolaparoscopy is shown in Table 5. The sensitivity, specificity, positive predictive value and negative predictive value were 76.2%, 88.6%, 64.0% and 93.3% respectively. The agreement between HSG and hysteroscopy was 86 %. Cohen's Kappa value is 0.605. The strength of agreement between HSG and hysteroscopy for tubal patency is considered to be substantial.

Table 5:- Comparison of tubal patency detection on HSG and combined Hysterolaparoscopy.

		Tubal patency on hysteroscopy		Total	p- value	Kappa
		Abnormal	Normal			
Tubal patency findings on HSG	Abnormal	16(TP)	9 (FP)	25	0.001	0.605
	Normal	5(FN)	70(TN)	75		

Total		21	79			

The distribution of operative procedures used in the study group is shown in Table-6.Hysteroscopic operative procedures involving endometrial polypectomy in four (4.0%) patients, Tubal cannulation in five (5.0%), uterine septum resection in four (4.0%), Intrauterine adhesiolysis of Asherman's Syndrome in two (2.0%) cases, and sub mucous fibroid resection was done in six (6.0%) patients. Our Laparoscopic operative procedures involving adhesiolysis done in seven (7.0%) cases, PCOD ovarian drilling in six (6.0%) patients, myomectomy in two (2.0%) cases, tubal reconstructive surgery in two (2.0%) cases, ovarian cystectomy in two (2.0%) cases and ablation for endometriosis was done in eight (8.0%) cases. The total operative hysteroscopy procedures were 21(21.0%) and the operative laparoscopic procedures in the same sitting were twenty seven (27.0%).

Table 6:- Distribution of operative procedures done with Laparohysteroscopy.

Operative procedures in same sitting					
Hysteroscopy Operative procedure	**No. of cases**	**% Of cases**	**Laparoscopic Operative procedure**	**No. of cases**	**% Of cases**
Endometrial polypectomy	4	4.0	Adhesiolysis	7	7.0
Tubal cannulation	5	5.0	PCOS drilling	6	6.0
Hysteroscopy resection of septum	4	4.0	Myomectomy	2	2.0
Adhesiolysis in Asherman's Syndrome cases	2	2.0	Tubal reconstructive surgery	2	2.0
Sub mucous fibroid resection	6	6.0	Ovarian cystectomy	2	2.0
			Ablation for Endometriosis	08	08
Total	**21**	**21**	**Total**	**27**	**27**

Discussion:-

A total of 100 subjects were analyzed in this study. 81% of subjects had primary infertility, and 19% had secondary infertility. The average age and BMI of women in our study were 26.50 ±3.52 years and 24.91 ±4.70 Kg/m^2, respectively. The mean duration of infertility was 3.25 ±1.64 years. This baseline data is comparable to distribution of cases of infertility in the study by Sharma R et al (2016)[7] and Niranjan N Chavan et al (2016)[8].

In the present study, 89 % of patients had a normal uterine cavity on HSG. This is comparable to Vaid et al (2014)9 who reported 91% normal uterine cavity findings in the present study, 11 % of patients were found to have the tubal block on HSG. This is comparatively less than findings by VR Shrinivasa et al (2009)10 who found 19 % of patients with the tubal block. In the present study, seven (7%) cases had a filling defect in the uterus while in a study by Onwuchekwa CR et al (2017)11, 78 cases (31.2%) had filling defect in uterus. In a study conducted by Aduayiet al (2016), 14 cases (10.4%) had a filling defect in the uterus12. In our study one (1%) case had uterine septum on HSG, while in a study conducted by Aduayi OS et al (2016); four cases (3%) had a uterine septum.

In our study 81 cases (81%) had normal findings in comparison to a study by Shakya et al[13] (2009), and 44 cases (88%) had normal hysteroscopy findings. In a study conducted by Pande B et al (2017), 273 cases (82.47%) had normal hysteroscopy findings[14]. Vaid et al reported normal uterine cavity in 61.1 % women on hysteroscopy.

In our study, sub mucous fibroids were detected in 6% of cases and endometrial polyps in 4 % cases. Intra uterine adhesions were noted in two patients on hysteroscopy. HSG had detected filling defects in 7 % of cases. The bicornuate uterus was detected in three cases on HSG, of which two patients had a uterine septum. Two patients with partial septum were not diagnosed on HSG. Vaid et al (9) detected ostial fibrosis in 15.02% of women, intrauterine adhesions in 11.91 %, followed by polyp or myoma in 6.21%, respectively, on hysteroscopy. Wadhwa

et al found uterine septum in 11 (10.25%) followed by ostial fibrosis in 10 (9.34%), pale or atrophic endometrium 8 (7.45%), endometrial polyp five (4.67%), and Asherman's syndrome in five (4.67%) women[15].

The sensitivity, specificity, positive predictive value and negative predictive value of HSG for tubal patency were 76.2%, 88.6%, 64.0% and 93.3% respectively. The false--negative cases on HSG were found to be due to peri tubal adhesions and likely due to extravagation of dye on HSG. There was 86 % agreement between HSG and hysteroscopy for tubal patency. S Das et al (2020)[16] found sensitivity, specificity, positive predictive value and negative predictive value of HSG for tubal patency were 80.85%, 74%, 49.35% and 92.5% respectively. In a study by Syeed Masuma Rizvi et al (2016)[17], sensitivity of HSG was 90.91% and specificity was 77.78% with positive predictive value of 83.33% and negative predictive value of 87.50%. Panda S R et al found 88.5 % agreement between HSG and hysterolaparoscopy for tubal patency[18].

In present study, 19 % patients had abnormal findings on Hysteroscopy; however corrective surgeries were performed in 21 % patients in the same setting. Hysteroscopy operative procedures involving endometrial polypectomy in 4(4.0%) patients, Tubal cannulation in 5(5.0%), uterine septum resection in 4 (4.0%), Intrauterine adhesiolysis of Asherman's Syndrome in 2(2.0%) cases and sub mucous fibroid resection was done in 6(6.0%) patients. These operative interventions are comparable to Sharma R et al (2016).

In the present study, 40 % patients had abnormal findings on laparoscopy. Corrective surgeries were performed in 27 % of patients in the same setting. Laparoscopic operative procedures involving adhesiolysis in seven (7.0%) cases, PCOD ovarian drilling in six (6.0%) patients, myomectomy in two (2.0%) cases, Tubal reconstructive surgery in two (2.0%) cases, ovarian cystectomy in two (2.0%) cases and ablation for endometriosis was done in eight (8.0%) cases. These procedures are comparable to Venkata Kiranmai Gottapu et al (2021)[19].

Laparoscopy has an upper hand in being diagnostic as well as therapeutic in these situations. Hence, hysterolaparoscopy should be offered as the first-line modality for the evaluation of infertility wherever the procedure is available.

Limitations of the study

There was inter-observer bias for HSG reporting. Pregnancy outcome was not recorded in this study.

Conclusion:-

See and treat the infertility factors shall be the reality and future argument in modern Gynecology within the limitations of this study. We conclude that hysterolaparoscopy should be offered as the first- line gold standard modality for the evaluation of infertility wherever the procedure is available.

Conflicts of interest:

Consent was obtained by all participants in this study. All authors have declared that no financial support was received from any organization for the submitted work. There are no other relationships or activities that could appear to have influenced this submitted work.

References:-

1. NICE guidelines (CG156) Published date: February 2013
2. Willem Ombelet, Ian Cooke, Silke Dyer, Gamal Serour and Paul Devroey. Infertility and the provision of infertility medical services in developing countries; Human Reproduction Update, 2008; 14 (6): 605–621
3. Gurunath S, Pandian Z, Anderson RA, Bhattacharya S. Defining infertility- A systematic review of prevalence studies. Hum Reprod Update. 2011; 17(5):575-88
4. Indian Council for Medical Research (ICMR) and National Academy of Medical Sciences (NAMS). National Guidelines for Accreditation, Supervision and Regulation of ART clinics in India. New Delhi: Ministry of Health and Family Welfare, Government of India., 2005.
5. Boivin J, Bunting L, Collins JA, Nygren KG. International estimates of infertility prevalence and treatment-seeking: potential need and demand for infertility medical care. Hum Reprod 2007; 22(6):1506-12.
6. Jejeebhoy S. Setting the stage. In: S J, editor. Looking back, looking forward: a profile of sexual and reproductive health in India. New Delhi: Rawat Publications; 2004.

7. Sharma R, Pandey VP, Sharma ST, Masand DL. Hystero-laparoscopy– 'See and Treat' Infertility, is a Reality in Modern Gynecological Practice. Ann. Int. Med. Den. Res. 2016; 2(5): OG09-OG13
8. Niranjan N Chavan, Swati Gawai, Neha Raj, PradnyaChangede. An observational study of the use of hystero laparoscopy in the diagnosis and management of infertility patients. Med Pulse – International Medical Journal. October 2016; 3(10): 889-892
9. Vaid K, Mehra S, Verma M, Jain S, Sharma A, Bhaskaran S: Pan endoscopic approach "hysterolaparoscopy" as an initial procedure in selected infertile women. J Clin Diagn Res. 2014, 8:95-8. 10.7860/JCDR/2014/7271.4018
10. VR Shrivastava, B Rijal, A Shrestha, HK Shrestha and AS Tuladhar. Detection of tubal abnormalities by HSG in Nepalese sub fertile women.
11. Nepal Med Coll J 2009; 11(1): 42-45
12. Onwuchekwa CR, Oriji VK. Hysterosalpingography (HSG) pattern of infertility in women of reproductive age. J Hum Reprod Sci 2017; 10:178-84.
13. Aduayi OS, Akanbi GO, Akintayo AA, Aduayi VA. Hysterosalpingography findings among women presenting for gynecological imaging in Ado-Ekiti, South western Nigeria. Int J Reprod Contracept ObstetGynecol 2016; 5:1906-11
14. Shakya B, Hysterosalpingography Vs Hysteroscopy in the Detection of Intrauterine Pathology in Infertility. Nepal Health Res Counc 2009 Apr;7(14):6-9.
15. Pande B, Dora SK, Pradhan S, Tiwary B. Role of hysterolaparoscopy for the evaluation of primary infertility: An experience from a tertiary care hospital. Int J Reprod Contracept ObstetGynecol 2017; 6:3473-6
16. Wadhwa L, Rani P, Bhatia P. Comparative prospective study of hysterosalpingography and hysteroscopy in infertile women. J Hum Reprod Sci 2017: 10;73-8
17. Subratta Das, Ajit R Bhattacharyya. Diagnostic accuracy of hysterosalpingography in comparison to laparoscopy to detect tubal occlusion in female infertility: An observational study. Panacea journal of Medical Sciences 2020:10(3):276-281
18. SyeedMasuma Rizvi et al (2016) Rizvi SM, Ajaz S, Gulshan, Nikita, Anjum S, Inara. Comparison of Hysterosalpingography and Laparoscopy in Diagnosis of Tubal Occlusion. Ann. Int. Med. Den. Res. 2016;2(4):165- 68.
19. Panda S R, Kalpana B (January 06, 2021) The Diagnostic Value of Hysterosalpingography and Hysterolaparoscopy for Evaluating Uterine Cavity and Tubal Patency in Infertile Patients. Cureus 13(1): e12526. DOI 10.7759/cureus. 12526
20. Venkata Kiranmai Gottapu, Dr. Maturu Sudha Kumari, Dr. DSSK Raju. Hysterolaparoscopy in assessment and management of female infertility. Int J Clin Obstet Gynaecol 2021;5(6):151-154.