



PREVALENCE AND DIAGNOSIS OF MULLERIAN ANOMALIES IN INFERTILE WOMEN USING DIFFERENT MODALITIES

Dr. Amita Yadav	Assistant Professor, Department of Obs. and Gynae, MLN Medical College, Prayagraj, Uttar Pradesh.
Dr. Archana Kumari*	Junior Resident, Department of Obs. and Gynae, MLN Medical College, Prayagraj, Uttar Pradesh. *Corresponding Author
Dr. Anupama Gupta	Junior Resident, Department of Obs. and Gynae, MLN Medical College, Prayagraj, Uttar Pradesh.

ABSTRACT *Objective:* To diagnose the various types of Mullerian abnormalities using different modalities and to find out its prevalence among infertile women. *Method:* A prospective study was conducted on 200 infertile women attending the outpatient and inpatient department of Obstetrics and Gynaecology in Swaroop Rani Nehru hospital and kamla Nehru Hospital of MLN medical College, Prayagraj during the year 2019-2020. Hysterosalpingography, 3D ultrasonography and hysterolaparoscopy was used as diagnostic modalities to find the prevalence of mullerian anomalies among infertile women of age group of 20 to 40 years. *Results:* A total of 18 cases (9%) were diagnosed to have mullerian anomalies which included 7 cases of partial septate uterus (3.5%), 2 cases (1%) each of complete septate, partial bicornuate and arcuate uterus respectively, 1 case (0.5%) each of agenesis, didelphys, complete bicornuate, unicornuate-non communicant and unicornuate without horn respectively. *Conclusion:* Prevalence of Mullerian anomalies in our study was 9% among infertile women, partial septate being the most common. Diagnostic hysterolaparoscopy was best investigation (sensitivity=100%, specificity=100%, PPV=100%, NPV=100%). 3D ultrasonography, being non-invasive and more convenient was strongly comparable to hysterolaparoscopy (κ value=0.906) than to hysterosalpingography (κ value=0.660).

KEYWORDS : Mullerian Anomaly, 3D ultrasonography, infertile women.

INTRODUCTION:

Infertility is defined as failure to conceive with unprotected intercourse for one year or more. Where as primary infertility includes those patients who have never conceived, secondary infertility denotes previous pregnancy irrespective of outcome but inability to conceive subsequently. Mullerian anomalies is the term used for the congenital defects in the development of embryonic structure called as mullerian ducts (named after Johannes Peter Muller). The majority of female reproductive tract develops from a pair of bilaterally symmetrical mullerian ducts (paramesonephric duct) that form fallopian tube, uterus, cervix and upper two third of vagina. The ovaries and the lower third of vagina have different embryological origin derived from germ cells that migrate from primitive yolk sac and the sino-vaginal bulbs, respectively. Uterine malformations are estimated to occur in 0.1-3% of general population, in 13.3% of infertile patients and between 3-38% in patients with recurrent miscarriage group¹.

Mullerian ducts anomalies are uncommon but can be treatable form of infertility. Women with congenital uterine anomaly typically do not have any symptoms, although some may experience painful periods. Most cases have good pregnancy outcome. However, these anomalies are often discovered during investigation for infertility or miscarriage. Moreover, depending upon the type and severity of mullerian anomalies, there may be increased risk of first and second trimester miscarriage, preterm birth, fetal growth restriction, preeclampsia and fetal malpresentation.²

The diagnostic method of determining the exact nature of anomaly have now progressed much beyond the earlier reliability on bimanual palpation and hysterosalpingography.

Advent of 3D USG has improved the diagnosis of uterine anomalies. It allows to view the coronal plane or, the slice of the body between the back and front & create 3D ultrasound image that makes internal structure more clear than 2D USG.

3D USG lacks many risks and side effects associated with Hysterosalpingography and Hystero-laparoscopy & offers diagnostic accuracy as compare with MRI or, combined Laparoscopy and Hysteroscopy (the gold standard).³

Hysteroscopy directly visualizes the endometrium, revealing nature, location, shape, size and vascular pattern of any uterine cavity abnormality. Hysteroscopy can be used in diagnosis and treatment of gynaecological patient, which include evaluation of infertility cases,

uterine anomaly, abnormal hystrogram and management of intrauterine adhesion.⁴ Laparoscopy is a definitive test for evaluation of tubal factor. It provides magnified view of uterine, tubal, ovarian and peritoneal surface. It can detect distal tubal occlusion, pelvic or adnexal adhesion, endometriosis and gives opportunity to treat disease at the time of diagnosis eg. lysis of filmy or focal adhesion, excision/ablation of superficial endometriosis.⁵ Hysteroscopy does not allow evaluation of external uterine contour, and thus a firm diagnosis of septate versus bicornuate uterus cannot be established simply by hysteroscopy alone.

AIMS AND OBJECTIVES:

- To find out the prevalence of Mullerian abnormalities in infertile women.
- To diagnose the various types of Mullerian anomalies in infertile women with the help of 3D ultrasonography, hysterosalpingography, hysteroscopy, and laparoscopy.
- To compare the diagnostic efficacy of different modalities used in the study.

MATERIALS AND METHODS:

The study was carried out on 200 infertile women attending outpatient department as well as those admitted in Gynecology wards in Swaroop Rani Nehru Hospital and Kamla Nehru Memorial Hospital, Department of Obstetrics and Gynaecology, Motilal Nehru Medical College, Prayagraj, were enrolled over a period of one year from 2019 to 2020.

CRITERIA FOR INCLUSION OF CASES:- Women between age of 20 to 40 years having complaint of infertility, Couple with normal semingram, Normal serum level of FSH, LH and Prolactin, History of previous abortions.

CRITERIA FOR EXCLUSION OF CASES:- Women with active pelvic infection, Past or present history of malignancy of reproductive tract, Couple with male factor infertility, Patients not fit for anaesthesia, Hyperprolactinaemia or thyroid function abnormality, Patients not ready to give written consent for procedure, Any other systemic illness or contraindication to procedure like severe cardiac/ respiratory diseases, peritonitis, diabetes mellitus, severe anaemia or severe urinary tract infection etc.

A written informed consent was obtained from all subjects prior to the performance of any study related procedure.

A Detailed clinical history was taken with special reference to age, Education, Occupation, Socioeconomic status, Residential area (rural/urban), Drug intake, Contraception use, Treatment received by husband, Coital frequency, Period of infertility, Seeking treatment for infertility and a known congenital anomaly in the patient.

Menstrual history was taken regarding -cycle, flow and duration, LMP (last menstrual period) association with pain in abdomen and passage of clots.

Obstetrical history was taken for – Duration of marriage, parity, previous abortion, mode of delivery, no of alive/dead infants.

After detailed history ,examination and routine investigations all the cases were subjected to hysterosalpingography, 3D ultrasonography, hysteroscopy and laparoscopy.American society of reproductive medicine(1988) classification were followed.



HYSTEROSCOPIC VIEW OF SEPTATAE UTERUS



LAPAROSCOPIC VIEW OF BICORNUATE UTERUS

**OBSERVATION:
ABNORMAL FINDING ON 3D- ULTRASONOGRAPHY**

FINDING	PRIMARY INFERTILITY		SECONDARY INFERTILITY		TOTAL %
	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL	
MULLERIAN ANOMALY:	12	6.0%	5	2.5%	8.5%
<i>Agenesis (Fundus)(Ic)</i>	1	0.5%	0	0%	0.5%
<i>Unicornuate (Non communicant) (IIb)</i>	1	0.5%	0	0%	0.5%
<i>Unicornuate (Without horn) (IIId)</i>	0	0%	1	0.5%	0.5%
<i>Didelphys(III)</i>	1	0.5%	0	0%	0.5%
<i>Bicornuate (Complete) (IVa)</i>	1	0.5%	0	0%	0.5%
<i>Bicornuate (Partial) (IVb)</i>	1	0.5%	1	0.5%	1.0%
<i>Septate (Complete) (Va)</i>	2	1.0%	0	0%	1.0%
<i>Septate (Partial) (Vb)</i>	4	2.0%	2	1.0%	3.0%
<i>Arcuate(VI)</i>	1	0.5%	1	0.5%	1.0%
OTHER (NON-MA)	36	18.0%	20	10.0%	28.0%
TOTAL	48/200	24%	25/200	12.5%	36.5%

TABLE 12 :ABNORMAL FINDING ON HYSTEOSALPINGO-GRAPHY IN INFERTILITY CASES

FINDINGS	PRIMARY INFERTILITY		SECONDARY INFERTILITY		TOTAL
	NUMBER	% OUT OF TOTAL	NUMBER	% OUT OF TOTAL	
MULLERIAN ANOMALY:	11	5.5%	3	1.5%	7.0%
<i>Agenesis (fundus)</i>	1	0.5%	0	0%	0.5%
<i>Unicornuate</i>	1	0.5%	1	0.5%	1.0%
<i>Didelphys</i>	1	0.5%	0	0%	0.5%
<i>Bicornuate/ Septate (Complete)</i>	3	1.5%	0	0%	1.5%
<i>Bicornuate/ Septate (Partial)</i>	4	2.0%	2	1.0%	3.0%
<i>Arcuate</i>	1	0.5%	0	0%	0.5%
OTHERS(NON-MA)	25	12.5%	12	6.0%	18.5%
TOTAL	36/200	18.0%	15/200	7.5%	25.5%

ABNORMAL FINDING ON DIAGNOSTIC HYSTERO-LAPAROSCOPY IN INFERTILITY CASES

FINDING	PRIMARY INFERTILITY		SECONDARY INFERTILITY		TOTAL
	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL	
UTERINE ANOMALY:	13	6.5%	5	2.5%	9.0%
<i>Agenesis (fundus) (Ic)</i>	1	0.5%	0	0%	0.5%
<i>Unicornuate (No communicant) (IIb)</i>	1	0.5%	0	0%	0.5%
<i>Unicornuate (without horn) (IIId)</i>	0	0%	1	0.5%	0.5%
<i>Didelphys</i>	1	0.5%	0	0%	0.5%
<i>Bicornuate (complete) (IVa)</i>	1	0.5%	0	0%	0.5%
<i>Bicornuate (partial) (IVb)</i>	1	0.5%	1	0.5%	1.0%
<i>Septate (complete) (Va)</i>	2	1.0%	0	0%	1.0%
<i>Septate (partial) (Vb)</i>	5	2.5%	2	1.0%	3.5%
<i>Arcuate</i>	1	0.5%	1	0.5%	1.0%
OTHERS(NON-MA)	52	26.0%	26	13.0%	39.0%
TOTAL	65	32.5%	31	15.5%	48.0%

PREVALENCE OF MULLERIAN ANOMALIES AMONG INFERTILE WOMEN OBSERVED IN OUR STUDY (ACCORDING TO ASRM CLASSIFICATION)

TYPES OF ANOMALY	NUMBER	% OF TOTAL
<i>Agenesi (fundus) (Ic)</i>	1	0.5%
<i>Unicornuat (No communicant) (IIb)</i>	1	0.5%
<i>Unicornuate (without horn) (IIId)</i>	1	0.5%
<i>Didelphys</i>	1	0.5%
<i>Bicornuat (complete) (IVa)</i>	1	0.5%
<i>Bicornuate(partial) (IVb)</i>	2	1.0%
<i>Septat (complete) (Va)</i>	2	1.0%
<i>Septat (partial) (Vb)</i>	7	3.5%
<i>Arcuate</i>	2	1.0%
TOTAL	18/200	9%

PREVALENCE OF MULLERIAN ANOMALY = 18/200 × 100 = 9%

VALIDITY OF 3-D USG AND HSG (IN REFERENCE TO DIAGNOSTIC HYSTERO-LAPAROSCOPY)

	SENSITIVITY	SPECIFICITY	PPV	NPV
3-D USG	88%	99%	94%	98%
HSG	62%	98%	78%	96%
HYSTERO-LAPAROSCOPY	100%	100%	100%	100%

AGREEMENT BETWEEN 3-D USG AND DIAGNOSTIC HYSTERO-LAPAROSCOPY

	Abnormal 3D USG	Normal 3D USG
Abnormal Hystero-laparoscopy	16	2
Normal Hystero-laparoscopy	1	181

Chi-square statistic = 164.355 ; P value = 0.001 ; Kappa value = 0.906 (very strong agreement)

AGREEMENT BETWEEN HSG AND DIAGNOSTIC HYSTERO-LAPAROSCOPY

	Abnormal HSG	Normal HSG
Abnormal Hystero-laparoscopy	11	7
Normal Hystero-laparoscopy	3	178

Chi-square statistic = 88.483 ; P value = 0.001 ; Kappa value = 0.660 (substantial agreement)

DISCUSSION:

In our study, out of 200 cases of infertility, 3D USG could diagnose mullerian anomaly in 17 cases (8.5%) in the form of uterine agenesis in 1 case, unicornuate uterus in 2 cases, uterus didelphys in 1 case, bicornuate (complete/ partial) uterus in 3 cases, septate (complete) uterus in 2 cases, septate (partial) uterus in 6 cases and arcuate uterus in 2 cases. Out of 6 partial septate uterus, 1 was ruled out by DHL. So true mullerian anomalies diagnosed by 3D USG was in 16 cases.

On hysterosalpingography, out of 200 infertile cases, mullerian anomaly was detected in 14 cases (7%) in the form of uterine agenesis in 1 case, unicornuate uterus in 2 cases, uterus didelphys in 1 case, bicornuate/ septate (complete) uterus in 3 cases, bicornuate/ septate (partial) uterus in 6 cases and arcuate uterus in 1 case. HSG could not differentiate bicornuate (complete/ partial) uterus from septate (complete/ partial) uterus. 2 cases of bicornuate/ septate (partial) uterus and 1 case of arcuate uterus diagnosed by HSG was ruled out by 3D USG and DHL. So, true mullerian anomaly detected by HSG was in 11 cases.

In diagnostic hysterosalpingographic examination, out of 200 infertile cases, mullerian anomalies were diagnosed in 18 cases in the form of, uterine agenesis in 1 case, unicornuate uterus in 2 cases, uterus didelphys in 1 case, bicornuate (complete/ partial) uterus in 3 cases, septate (complete) uterus in 2 cases, septate (partial) uterus in 7 cases and arcuate uterus in 2 cases. 2 cases of partial septate uterus diagnosed by DHL could not be detected by 3D USG. 5 cases of partial septate uterus and 2 cases of arcuate uterus diagnosed by DHL could not be detected by HSG.

In the present study, out of 200 infertile women, mullerian anomaly was present in 18 cases, i.e. prevalence was 9.0%. The prevalence found in our study was same as in the study conducted by Chann Y Y et al (2011)⁶ (prevalence was 8%), while it was less than the prevalence of 14% in the study conducted by Maiti GD (2018)⁷. In the present study, sensitivity, specificity, positive predictive value and negative predictive value of 3D USG was 88%, 99%, 94% and 98% respectively. The data found in our study was more comparable to study conducted by B Graupera et al (2015)⁸.

In the present study, sensitivity, specificity, positive predictive value and negative predictive value of HSG was 62%, 98%, 78% and 96% respectively. The data found in our study was more comparable to the study conducted by Kumar et al (2011)⁹, in which only sensitivity and specificity (60% and 90% respectively) was given.

In our study, kappa value of agreement between 3D USG and diagnostic hysterosalpingography was 0.906 with p value of 0.001 suggesting very strong agreement. Although, in no any other recent studies kappa value of agreement between these diagnostic modalities have been calculated, Tullio Ghi et al (2009) in their study group of 284 women they found that out of 54 cases of mullerian anomaly on 3D USG, 52 i.e. 96% had absolute concordance with hysterosalpingography.

In our study, kappa value of agreement between HSG and diagnostic hysterosalpingography was 0.660 with p value of 0.001 suggesting substantial agreement. Although, in no any other recent studies kappa value of agreement between these diagnostic modalities have been calculated, Saxena A et al (2015) in their study have found the positive predictive value and false negative rate (FNR) of hysterosalpingo-

graphy as compared with hysterosalpingography to be 70% and 12.96% respectively.

CONCLUSION:

Prevalence of Mullerian anomalies in our study was 9% among infertile women, septate uterus being the most common type followed by arcuate and bicornuate uterus. Among the different diagnostic modalities used, combined hysterosalpingography, apart from its therapeutic benefits, though an invasive procedure but by virtue of its ability to visualize the uterus from both inside and outside, was the best investigation with highest accuracy and confirmatory value. The 3D ultrasonography, being non-invasive and more convenient was strongly comparable to hysterosalpingography in its diagnostic efficacy. Moreover, 3D ultrasonography is the only modality which has the advantage of measuring precisely various parameters like length, width, thickness and volume etc. Hysterosalpingography showed the lowest diagnostic efficacy as compared to both 3D ultrasonography and hysterosalpingography in diagnosing the mullerian abnormalities.

REFERENCES

1. Ahmed M, El Huseiny a, Reda A, Ahmad a, Somayya M, Sadek a, Ghada K, Gouhar b, Haitham A, Dawood (2014); Role of three-dimensional ultrasound in the diagnosis of double uterine cavity anomalies and concordance with laparoscopic and hysteroscopic diagnosis; Egyptian Society of Radiology and Nuclear Medicine.
2. MA Akhtar, SH Saravolos, TC Li, K Jayaprasakan (2019); **Reproductive Implications and Management of Congenital Uterine Anomalies; Paper No. 62 ; British journal of obstetrics and gynaecology.**
3. Marc A. Fritz and Speroff; Clinical gynaecologic endocrinology and infertility: Eighth edition (2018); page no. 1171.
4. G. Benagiano, L. Mencaglia ; Diagnostic hysteroscopy: Practical training and research in Gynaecologic endoscopy; Geneva foundation for medical education and research.
5. Marc A. Fritz and Speroff; Clinical gynaecologic endocrinology and infertility: Eighth edition (2018); page no. 1180.
6. Y.Y. Chan, K. Jayaprasakan, J. Zamora, J.G. Thornton, N. Raine-Fenning, and A. Coomarasamy; The prevalence of congenital uterine anomalies in unselected and high-risk populations: a systematic review; Human Reproduction Update, Vol.17, No.6 pp. 761-771, 2011.
7. G. D. Maiti, Prasad Lele; Hysterosalpingography (HSG), hysteroscopy and laparoscopic evaluation of female genital tract of patient attending tertiary infertility centre and correlation of various modalities; Int J Reprod Contracept Obstet Gynecol. 2018 Apr;7(4):1597-1601.
8. B Graupera, MA Pascual, L Hereter, J L Browne, B Ubeda, I Rodriguez, C Pedrero; Accuracy of three-dimensional ultrasound compared with magnetic resonance imaging in diagnosis of Mullerian duct anomalies using ESHRE-ESGE consensus on the classification of congenital anomalies of the female genital tract: Ultrasound Obstet Gynecol 2015 Nov;46(5):616-22. doi: 10.1002/uog.14825.
9. Kumar S, Awasthi RT, Gokhale N (2011). Assessment of uterine factor in infertile women: Hysterosalpingography vs Hysteroscopy; Med J Armed Forces India; 10.1016/S0377-1237(04)80156-4.