

# Role of Transvaginal Sonography and Diagnostic Hysteroscopy in Evaluation of Endometrial Cavity in Infertile Women

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## ABSTRACT

**Introduction:** Uterine cavity assessment is an integral part of a thorough infertility work up. The objectives of the study were to assess the diagnostic value of Transvaginal sonography in comparison with hysteroscopy in the evaluation of endometrial cavity in infertile women and to evaluate whether Transvaginal sonography is an effective screening modality for intrauterine abnormalities

**Material and methods:** In a prospective cohort study, 100 infertile women were included, and after taking informed consent and detailed history all participants underwent gynaecological examination, TVS and Hysteroscopy as part of routine infertility work up.

**Results:** Hysteroscopy was considered the gold standard. With TVS, Endometrial Hyperplasia (n=14, 14%), submucous fibroids (n=13, 13%), endometrial polyps (n=27, 27%), adhesions (n=2, 2%), congenital anomalies (n=15, 15%) were detected. With Hysteroscopy endometrial hyperplasia (n=10, 10%), submucous fibroids (n=14, 14%), endometrial polyps (n=21, 21%), adhesions (n=4, 4%), congenital anomalies (n=15, 15%) were detected.

**Conclusion:** Transvaginal sonography has proved to be of immense value in the evaluation of infertile women because of its non invasive, cost effective and feasible nature. It is found to diagnose uterine abnormalities with a sensitivity of 97.07% and positive predictive value of 99.77% thus can be considered as an initial investigation in the infertility work up.

**Keywords:** Hysteroscopy, Infertility, Transvaginal Sonography, Uterine cavity abnormalities

## INTRODUCTION

Uterine cavity assessment is an important aspect of female infertility work up. Structural pathology in the uterine cavity such as congenital Mullerian anomalies and intrauterine lesions can affect endometrial receptivity, resulting in implantation failure which may manifest as RPL or infertility.<sup>1</sup> Uterine cavity abnormalities can be the cause of infertility in 10 to 15% of women. Abnormal uterine cavity findings may occur in approximately 50% infertile women.<sup>2</sup> Uterine cavity evaluation is thus recommended to screen fibroids, polyps, adhesions and uterine Mullerian abnormalities. Efficient detection and adequate management of lesions is imperative in infertile women so that optimal fertility treatment can proceed. Ultrasound imaging of the female reproductive tract was first described in 1972 by Kratochwil et al.<sup>3</sup> The recent advances in ultrasound technology have promoted transvaginal sonography as a non invasive, low cost alternative to hysteroscopy. It provides a good visualization of endometrium, midline echo and uterine cavity.

Hysteroscopy is considered the gold standard for visualization of the uterine cavity and cervical canal. It records the findings photographically and by videotape for further evaluation and comparison and allows the identification of a number of pathologies including polyps, submucous fibroids, endometrial thickness and others.<sup>6</sup> It also allows therapeutic intervention at the same time for the treatment of detected pathology.

The WHO recommends the use of hysteroscopy only when clinical or ultrasound or HSG examinations suggest any abnormality.<sup>7,8</sup> TVS has recently become a first line mandatory step in the initial evaluation of uterine abnormalities before resorting to invasive procedures such as hysteroscopy. It is readily available, cost effective and non invasive and universally preferred as the initial diagnostic procedure. The aim of this study was to evaluate the accuracy of transvaginal ultrasound and hysteroscopy in detection of endometrial pathology in infertile women.

## MATERIAL AND METHODS

It was a prospective cohort study conducted in the department of obstetrics and gynecology, Yashoda Hospital, for a period of 3 years. 100 married women (18 to 45 years) were included in the study after taking their informed consent for participation

**Inclusion criteria:** All cases of primary and secondary infertility

**Exclusion criteria:** Known cases of congenital abnormalities of the uterus, acute pelvic inflammatory disease, and vulvovaginitis.

## Methodology

An informed consent was taken from every participant. A detailed history, general and gynecological examination were performed.

## Ultrasound Evaluation

All patients underwent TVS during the late follicular phase of the cycle using the S6 Voluson imaging machine with a 7.5 MHz endovaginal probe. The endometrial cavity was

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measured in two perpendicular plane sagittal and transverse view. Irregularities, thickness, echo pattern of endometrium and myometrium interphase in long axis and in transverse plane were noted.

### Hysteroscopic Evaluation

Hysteroscopy was done in the same cycle. The Bettocchi hysteroscope was used. Telescope was 4 mm 30 degrees oblique lens with a 5 mm sheath. Haeger s dilator upto no 8 was used in some patients. The uterine cavity was distended by normal saline solution and intra uterine pressure was controlled by an irrigation suction device. All women with significant clinical abnormalities underwent operative hysteroscopy at once and specimen obtained was sent for histopathological examination. Patients were observed for post operative complications and discharged the same day.

### STATISTICAL ANALYSIS

Statistical analysis was done with SPSS software 16.0 using student t test for comparing parametric data, and chi square test for comparing non parametric data.  $P$  value  $< 0.05$  was considered significant. Sensitivity, specificity, Positive predictive value (PPV) and Negative Predictive value (npv) and overall accuracy were calculated.

### RESULTS

In the present study, 74 cases were primary infertility and 26 cases were secondary infertility. In 100 population TVS

detected 29 cases as normal and 71 cases as abnormal. Hysteroscopy detected 36 cases as normal and 64 cases as abnormal.

Out of 64 abnormal cases, 10 cases had endometrial hyperplasia, had submucous fibroids, 21 had endometrial polyps, 4 cases had adhesions and 15 cases had congenital anomalies. Out of 15 cases of congenital anomalies, 4 cases had subseptum, 4 cases had septum, 6 cases had bicornuate uterus, 1 had arcuate uterus, endometrial polyps were a common finding in this study (table-1-3).

TVS detected 14 cases as endometrial hyperplasia whereas hysteroscopy detected 10 cases as endometrial hyperplasia (table-2). The sensitivity and specificity of TVS for endometrial hyperplasia is 95% and 100% respectively (table-4). The positive and negative predictive value is 100% and 71.4% with accuracy rate of 96%. The sensitivity and specificity for submucous fibroids found to be 100% and 92.86% and negative predictive value is 98.85% and 100% with an accuracy rate of 99%. In case of endometrial polyps, TVS detected 6 cases as false positive, 21 cases were true positive. The sensitivity and specificity of TVS in detecting endometrial polyps is 92.41% and 100%. The PPV and NPV is 100% and 77.78% with an accuracy rate of 94%. TVS failed to diagnose adhesions in 2 cases where hysteroscopy detected, with accuracy rate of 98%. In case of congenital anomalies the accuracy rate of TVS is 100%. TVS correctly diagnosed subseptum and arcuate uterus. In

Uterine findings	(n=100)	%
Normal	29	29
Endometrial Hyperplasia	14	14
Submucous fibroids	13	13
Endometrial polyps	27	27
Adhesions	2	2
Congenital anomalies	15	15
Total	100	100

**Table-1:** Transvaginal sonography findings of uterine cavity

Uterine findings	(n=100)	%
Normal	36	36
Endometrial Hyperplasia	10	10
Submucous fibroids	14	14
Endometrial polyp	21	21
Adhesions	4	4
Congenital Anomalies	15	15
Total	100	100

**Table-2:** Hysteroscopy findings of uterine cavity

Uterine findings	TVS Cases	TVS%	Hysteroscopy cases	Hysteroscopy%
Normal	29	29	36	36
Submucous fibroid	13	13	14	14
Endometrial polyps	27	27	21	21
Adhesions	2	2	4	4
Congenital anomalies	15	15	15	15
Endometrial hyperplasia	14	14	10	10
Total	100	100	100	100

**Table-3:** Comparative evaluation of TVS and Hysteroscopy

TVS	Sensitivity	Specificity	Positive predictive value	Negative predictive value	Accuracy rate
Endometrial hyperplasia	95%	100%	100%	71.4%	96%
Submucous fibroids	100%	92.86%	98.85%	100%	99%
Endometrial polyps	92.41%	100%	100%	77.78%	94%
Adhesions	97.96%	100%	100%	50%	98%
Congenital anomalies	100%	100%	100%	100%	100%

The association between TVS and Hysteroscopy is statistically significant with  $p$  value  $< 0.001$ .

**Table-4:** Association between TVS and hysteroscopy

identifying the septum by TVS., 2 cases were false positive and 2 cases of bicornuate uterus were missed. Maximum number of abnormal Uterine findings as a cause of infertility i.e. 76.19% were in the age group > 31 years. Minimum no of uterine findings were in the age group of 25 years. As age increases the acquired causes for infertility are increasing.

## DISCUSSION

Uterine cavity assessment is a vital part of infertility work up. TVS is used to assess ovaries, fallopian tubes and adnexa and is preferred as it is readily available, low cost and does not use any ionizing radiation. Hysteroscopy is considered gold standard for endouterine pathologies such as submucous fibroids and congenital uterine abnormalities. In the last decade improvements in the ultrasound technology and hysteroscopy techniques have changed the diagnostic approach in infertility patients.<sup>4</sup>

In this study we evaluated the role of TVS and Diagnostic hysteroscopy in 100 infertile patients. In our study the incidence of primary infertility was 76% and that of secondary infertility was 24% which co relates with the studies conducted by Hajishaisha et al.<sup>5</sup> We studied the uterine cavity in the late follicular phase for better ultrasound imaging of the endometrium.

Endometrial polyps were a common finding in our study (21%). In our case out of the 27 cases of endometrial polyp detected by TVS, 21 were confirmed by hysteroscopy. We found discrepancy in between TVS and hysteroscopy in 6% cases, 2% cases had normal endometrium and 4% had endometrial hyperplasia. Using hysteroscopy as a gold standard, TVS showed excellent specificity 100%, good sensitivity 92.4%, 77.8% NPV, 100% PPV with an accuracy rate of 94%.

Another common finding in our study was endometrial hyperplasia. TVS detected endometrial hyperplasia in 14% women involved in this study, where as hysteroscopy detected in 10% women. Out of 14 cases, TVS correctly diagnosed 10 cases as endometrial hyperplasia which correlated with hysteroscopy and remaining 4 cases revealed as endometrial polyp in hysteroscopy. Thus we found TVS had 95% sensitivity, 100% specificity and PPV, 71.4% NPV and 96% accuracy for the diagnosis of endometrial hyperplasia in comparison to hysteroscopy as gold standard. TVS was able to diagnose submucous fibroid with high sensitivity 100%, 92.86% specificity, the PPV and NPV is 98.85 and 100%. Submucous fibroid was found in 14 patients (14%), 11 primary infertility and 3 with secondary infertility. Intrauterine adhesions were detected in 4% women in our study. Using hysteroscopy as the gold standard TVS showed 97.6% sensitivity and 100% specificity. TVS failed to diagnose adhesions in 2 out of 4 patients. It is recommended in the case of endometrial adhesion detected by sonography, the final diagnosis needs to be confirmed by sonohysterography which separates the two layers of endometrium or by diagnostic hysteroscopy.

We found congenital uterine malformation in 15% of infertile women. TVS was able to detect uterine subseptum

and arcuate uterus with quite significant accuracy (100% sensitivity and 100% specificity). Out of 10 patients who had septum and bicornuate uterus, TVS correctly diagnosed in 8 patients and missed 2 cases of bicornuate uterus. We recommend 3D TVS in such cases.

## CONCLUSION

Examination of the uterine cavity is an integral part of any thorough evaluation of infertile women. Transvaginal sonography, when performed during the follicular phase, can detect most intrauterine abnormalities. It can be concluded that TVS can be relied upon for the initial investigation of infertile women avoiding routine hysteroscopy and the costs incurred with it. Hysteroscopy may be reserved for women with an abnormal TVS, who did not respond to initial ovulation induction and intrauterine insemination. Hence transvaginal sonography may be used as the initial diagnostic procedure.

The association between TVS and Hysteroscopy is statistically significant with p value <0.001.

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