Research Article

Correlation of Day 2 Transvaginal Sonography with Hysteroscopy in Infertility

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Abstract

Aim: The aim of the present study was to correlate findings of day 2 transvaginal ultrasound with those of hysteroscopy in cases of unexplained infertility.

Material and Method: A prospective comparative study was conducted at Department of Obstetrics and Gynaecology in Asian institute of medical sciences (tertiary care centre). Primary/Secondary infertility cases where no definitive cause was identified after routine infertility work up.

All patient were subjected to day 2 transvaginal ultrasound and hysteroscopy in early follicular phase (day 6-day 10).

Result: Highest diagnostic accuracy of day 2 TVS with Hysteroscopy was found for endometritis and uterine malformation while poor level of agreement was observed between the final diagnosis by TVS and hysteroscopy.

Keywords: Infertility; Hysteroscopy; TVS (TransVaginal Sonography)

Abbreviation

TVS: Transvaginal Sonography; ICSI: Intracytoplasmic Sperm Injection; IUI: Intrauterine Insemination; SHG: Sonohysterography; HSG: Hysterosalpingography.

Introduction

Procreation has always been an important landmark in human life, but a large number of circumstances might make it impossible for many, so much so that today it is considered as a significant health issue. Infertility is defined as one year of unprotected regular intercourse without conception. It affects approximately 10-15% of couples [1].

The prevalence has increased in the last decade. Evaluation of the uterine cavity is the important part of examination of infertile women as Intrauterine pathologies are found to be present in 25% of infertile patients [2]. The first line diagnostic tool for uterine abnormalities is transvaginal sonography (TVS).

Hysteroscopy is the second step, which serves as a gold standard after an ultrasound examination screening. The advantage of hysteroscopy is that it is diagnostic and therapeutic at the same time.

The aim of the present study was to correlate findings of day 2 transvaginal ultrasound with those of hysteroscopy in cases of unexplained infertility.

Material and Method

A prospective comparative study was conducted at Department of Obstetrics and Gynaecology of a tertiary care centre. Primary/Secondary infertility cases where no definitive cause was identified after routine infertility work up.

Seventy five women with infertility attending the out patient Department of Obstetrics and Gynaecology of Asian Institute of Medical Science and Research, Faridabad were included in the study. An

informed consent was taken from all the women. All study subjects were examined by TVS and hysteroscopy. Uterine cavity findings were then correlated from two evaluation modalities.

Observation

In our study population, 82.6% were below the age of 35 years. Mean age of patient was 31.85 ± 4.45 rangging from 24-42 years. Primary infertility was diagnosed in 57.3% of the cases, while secondary infertility in 42.6% of the cases.

Age groups	Frequency	Percentage
35 years or less	62	82.67%
More than 35 years	13	17.33%
Total	75	100.00%

Table 1: Distribution of patients according to their age.

Type of infertility	Frequency	Percentage
Primary	43	57.33%
Secondary	32	42.67%
Total	75	100.00%

Table 2: Distribution of cases according to the type of infertility

Failed ICSI was reported by 3 patients, failed IUI procedure were reported by 8 patients. Most common menstrual complaint was provided by the women in the study sample was menorrhagia (n= 12), delayed cycles (n=6), oligomenorrhea (n=6), short cycles (n=5) and recurrent abortions (n=3).

Uterine cavity shape and size was diagnosed using TVS, it was normal in 69.3% of the cases.

Uterine cavity diagnosis by TVS	Frequency	Percentage
Arcuate	2	2.67%
Bicornuate	1	1.33%
Irregular	15	20.00%
Large	2	2.67%
Normal	52	69.33%
Small	3	4.00%
Total	75	100.00%

Table 3: Distribution of cases according to the shape and size of uterine cavity diagnosis by TVS.

Uterine cavity (hysteroscopy findings)	Frequency	Percentage
Arcuate	1	1.33%
Double	1	1.33%
Irregular	12	16.00%
Large	3	4.00%
Normal	41	54.67%
Polyp seen	1	1.33%
Small	12	16.00%
Tubular	4	5.33%
Total	75	100.00%

Table 4: Distribution of cases according to the hysteroscopic findings of the uterine cavity.

Hysteroscopy found the uterine cavity to be normal in 54.67% of the cases. It was found to be irregularly shaped and small in size in 12 cases each. Four women had a tubular uterine cavity. Arcuate uterine cavity, bicornuate uterus and polyps were seen in one patient each.

Arcuate uterine cavity was diagnosed by both the diagnostic modalities. Hysteroscopy diagnosed irregular uterine cavity in

Diagnosis	Sensitivity	Specificity	PPV	NPV	Diagnostic accuracy
Abnormal	45.45%	87.50%	95.24%	22.58%	51.92%
95% CI	30.39% to 61.15%	47.35% to 99.68%	76.18% to 99.88%	9.59% to 41.10%	
Adhesions	22.73%	96.67%	83.33%	63.04%	65.38%
95% CI	7.82% to 45.37%	82.78% to 99.92%	35.88% to 99.58%	47.55% to 76.79%	
Fibroid	42.86%	100.00%	100.00%	91.84%	92.31%
95% CI	9.90% to 81.59%	92.13% to 100.00%	29.24% to 100.00%	80.40% to 97.73%	
Hyperplasia	100.00%	85.71%	30.00%	100.00%	86.54%
95% CI	29.24% to 100.00%	72.76% to 94.06%	6.67% to 65.25%	91.59% to 100.00%	
Endometritis	0.00%	100.00%	-	98.08%	98.08%
95% CI	0.00% to 97.50%	93.02% to 100.00%	-	89.74% to 99.95%	
Polyp	12.50%	97.73%	50.00%	86.00%	84.62%
95% CI	0.32% to 52.65%	87.98% to 99.94%	1.26% to 98.74%	73.26% to 94.18%	
Uterine malformation	0.00%	100.00%	-	94.23%	94.23%
95% CI	0.00% to 70.76%	92.75% to 100.00%	-	84.05% to 98.79%	

Table 5: Diagnostic accuracy of TVS for various diagnosis (when compared with hysteroscopy).

12 patients, half of which were diagnosed by TVS as well. Large uterine cavity was diagnosed by both the modalities in one patient only and no abnormality was diagnosed by both the TVS and hysteroscopy in 33 patients. Of the 12 patients diagnosed as having small uterine cavity, only three were similarly diagnosed by TVS, eight were considered as normal and one as irregular. Overall for the diagnosis regarding the uterine cavity, fair level of agreement between TVS and hysteroscopy was found(kappa = 0.28, p value <0.001) which is a statistically better informative modality.

Highest level of diagnostic accuracy of TVS was found for Endometritis (sensitivity = 0%, specificity = 100%, diagnostic accuracy = 98.08%), which means a positive TVS result is very helpful in the diagnosis of Endometritis in infertility patients. Similarly, TVS had

a very high diagnostic accuracy for uterine malformation (sensitivity = 0%, specificity = 100%, diagnostic accuracy = 94.23%). For submucosal fibroids, TVS was found to have a sensitivity of 42.86%, specificity of 100% and diagnostic accuracy of 92.31%). Thus, though TVS is not very helpful in ruling out submucosal fibroids infertility patients, a positive TVS result for fibroid is excellent in making the diagnosis. For diagnosing hyperplasia, TVS had a 100% sensitivity and 85.7% specificity. For polyp, TVS had a sensitivity of 12.5%, specificity of 97.7% and over all diagnostic accuracy of 84.6%. However TVS had very low sensitivity for diagnosing adhesions (22.7%) with a diagnostic accuracy of 65.3% only. TVS had except for hyperplasia, very low sensitivity in diagnosing various conditions in infertility. However, the specificity for diagnosing various conditions was high (ranging 85.7% to 100%).

Diagnosis by TVS	Diagnosis by Hysteroscopy									
	Adhesions	Fibroid	Hyperplasia	Normal	Polyp	Endometritis	Uterine malformation	Total	p value	k
Adhesions	5 (13.1%)	0 (0%)	0 (0%)	1 (9%)	0 (0%)	0 (0%)	0 (0%)	6 (8%)		
Fibroid	0 (0.00%)	3 (42.86%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	3 (4.00%)		
Hyperplasia	0 (0%)	0 (0%)	3 (100%)	0 (0%)	6 (75%)	0 (0%)	1 (20%)	10 (13.3%)	<0.001	0.158
Non-diagnosis	16 (42.1%)	0 (0.00%)	0 (0.00%)	3 (27.27%)	0 (0%)	2 (66.7%)	2 (40%)	23 (30.7%)		
Normal	16 (42.1%)	4 (57.14%)	0 (0.00%)	7 (63.64%)	1 (12.5%)	1 (33.33%)	2 (40%)	31 (41.3%)		
Polyp	1 (2.6%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	1 (12.5%)	0 (0.00%)	0 (0%)	2 (2.7%)		
Total	38 (100%)	7 (100%)	3 (100%)	11 (100%)	8 (100%)	3 (100%)	5 (100%)	75 (100%)		

Table 6: Level of agreement between diagnosis by TVS and diagnosis by hysteroscopy.

Adhesions were diagnosed in a total of 38 patients by hysteroscopy, of which in only five patients were diagnosed by TVS. Submucosal fibroids were diagnosed by hysteroscopy in a total of 7 patients, of which in only three patients were picked up by TVS. All three patients with hyperplasia were correctly diagnosed by both TVS and hysteroscopy. Of the 11 patients diagnosed with no abnormality on hysteroscopy, seven were diagnosed correctly with TVS. On the whole, poor level of agreement was observed between the final diagnosis by TVS and hysteroscopy (kappa value = 0.15, p value <0.001) which was statistically not significant.

Discussion

An infertility evaluation is usually initiated after one year of regular unprotected intercourse in women under age 35 and after six months of unprotected intercourse in women of age 35 and older. However, the evaluation may be initiated sooner in women with irregular menstrual cycles or having other known risk factors for infertility, such as endometriosis, a history of pelvic inflammatory disease, or reproductive tract malformations. Multiple diagnostic modalities have been proposed for evaluation of female infertility. Some of these tests are supported by good evidence, while others

are not. The uterine cavity can be evaluated by hysterosalpingography (HSG), transvaginal ultrasound (TVS), sonohysterography (SHG), and hysteroscopy. In the present comparative study, women with primary and secondary infertility in whom no definitive cause could be identified after routine infertility work up were included and subjected to TVS and hysteroscopy after routine laboratory work up and the results of these two modalities were compared, using hysteroscopy as the reference standard.

Highest level of diagnostic accuracy of TVS was found for endometritis (sensitivity = 0%, specificity = 100%, diagnostic accuracy = 98.08%), which means a positive TVS result is very helpful to make the diagnosis of endometritis in infertility cases.

While investigating women with abnormal uterine bleeding, Goyal., *et al.* found the kappa value to be 0.898, indicating very good strength of agreement between TVS and hysteroscopy for assessment of the uterine cavity [3]. Similarly, TVS in our study had a very high diagnostic accuracy for uterine malformation (sensitivity = 0%, specificity = 100%, diagnostic accuracy = 94.23%).

In our study, TVS had a PPV of 83.3% and NPV of 63.04% for detecting adhesions, a PPV of 100% and NPV of 91.84% for detecting submucosal fibroids and a PPV of 50% and NPV of 86% for detecting polyps. Narayan and Goswamy stated that TVS had PPV of 85-95% for specific uterine abnormalities detected at hysteroscopy in an infertile population [4].

For diagnosing hyperplasia, in our study, TVS was 100% sensitive and 85.7% specific.

Hysteroscopy has been shown to provide an accurate description of the endometrial cavity [5], since total agreement was shown by Bingol between hysteroscopy and the gold standard in the diagnosis of endometrial hyperplasia and polypoid lesions of the uterine cavity, with 100% accuracy [6,7].

In our study, there was a poor level of agreement between the final diagnosis by TVS and hysteroscopy (kappa value = 0.15, p value <0.001). And for the diagnosis regarding the uterine cavity, fair level of agreement was found (kappa = 0.28, p value < 0.001). On the other hand Shukla., et al. demonstrated a moderate level of agreement between the findings of TVS and hysteroscopy (kappa = 0.41, p value = 0.001).

Limitation in our study is that we didn't include Saline Infusion Sonohysterography as method to evaluate the endometrium

Conclusion

The results of our study provide good quality, valuable information about TVS used in basic work up evaluation of infertile women. Highest diagnostic accuracy of TVS with hysteroscopy was found for endometritis and uterine malformation. There was poor level of agreement between the final diagnosis by TVS and hysteroscopy.

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