ORIGINAL ARTICLE

Comparison of transvaginal ultrasound with hysteroscopy in evaluating uterine cavity and its abnormalities in patients of infertility prior to IVF: A hospital based prospective study

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ABSTRACT

Introduction: One of the major problems affecting human reproduction that bothers many men and women is infertility, that affect 10-15% of couples in reproductive age group. Infertility can be attributed to a galaxy of factors. Only pelvic examination may not be able to appropriate all the abnormalities related to infertility. Hence, need of other diagnostic and therapeutic investigation. Transvaginal Ultrasound(TVS) has recently become first line mandatory step in the initial evaluation of uterine abnormalities, but various studies have proved hysteroscopy as gold standard. **Aim:** To compare transvaginal ultrasound findings with hysteroscopic findings in evaluation of uterine cavity, ad its abnormalities in patient of infertility prior to IVF. **Methods:** It was a hospital based prospective study conducted at a tertiary centre of Punjab for a period of 18 months after getting approval from IEC. 100 patients of Infertility were evaluated by TVS followed by hysteroscopy. The findings were noted and statistical analysis was carried out. **Results**: The sensitivity, specificity, PPV, NPV and accuracy of TVS were 82.05%, 72.73%, 91.43%, 66.33%, 80% while that of hysteroscopy were 92.74%, 97.8%,100%, 86%, 92% respectively. Hysteroscopy and TVS when combined together for evaluation of intrauterine pathologies, the sensitivity, specificity, PPV, NPV and accuracy increased to 98.65%, 100%, 100%,97.89% and 95% respectively. **Conclusion**: TVS is a sensitive, low cost and non invasive tool to find out any pelvic pathology in patients of infertility. As far as uterine evaluation is concerned, hysteroscopy proves to be more sensitive tool. However, if both are used together the diagnostic yield in terms of sensitivity and specificity is still higher.

Keywords: Transvaginal Ultrasound TVS, Primary Infertility, Secondary Infertility, Hysteroscopy,

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INTRODUCTION

Attaining parenthood is the most basic and desired goal of a healthy marital and social life, particularly in a culturally rich country like India wherein infertility has more adverse social and psychological implications. Being childless is an undesired social role and infertility is an unexpected life transition and most of the time women bear the brunt of it[1]. Infertility is a grave health issue, affecting approximately 8%–10% of the couples worldwide. Of these, probably between 15 and 20 million amounting to 25%, are in India alone[2].Taking into consideration the current population statistics, this would extrapolate to a huge burden to the society. By clinical definition, infertility is the inability to conceive after one year of intercourse without contraception[3,4.] A plethora of causes can be attributed to infertility with female factors contributing to 40% of the cases respectively[5]. Amongst them, uterine factors contribute to 15-20% of the cases[5]. Uterine cavity pathologies, such as polyps, fibroids, Mullerian anomalies play a significant role in infertility[6]. The advent of assisted reproductive techniques (ART) is a sigh of relief for couples awaiting parenthood. A thorough physical and pelvic examination is a must before ART so as to delineate the size, shape and

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position of the uterus and evaluate the adnexa to rule out any evidence of intrauterine pathology. However all uterine problems cannot be delineated with appropriate pelvic examination and assisted diagnostic modalities like Transvaginal ultrasonography (TVS), abdominal ultrasound, hysteroscopy and hysterosalpingography are the saviours. TVS is a low cost, non-invasive method that allows visualization of the endometrial appearance, mid line echo and uterine cavity[7,8]. On other hand, hysteroscopy is an invasive procedure and allows three dimensional direct visualization of endometrial cavity[9,10]. It gives an opportunity to identify the nature of the endometrial abnormalities and provides the option of direct optical-guided biopsies. The diagnostic value of both techniques are often correlated and have been found to have controversial results[9]. Taking this into consideration, this study was planned to find the best diagnostic modality for examination of uterine cavity in patients of infertility before ART for better chances of parenthood. The aim of this study is to compare TVS findings with hysteroscopic findings in evaluation of uterine cavity and its abnormalities prior to ART.

METHODS

It was a hospital based prospective study conducted in the department of Obstetrics and gynaecology at Adesh institute of medical sciences and research, Bathinda, Punjab for a period of 18 months from November 2019 to April 2021. The study was approved from the Research committee, AIMSR and Ethics committee**,** Adesh University. Patients with unexplained infertility for > 3years aged less than 36 years, unexplained infertility for > 1 year aged more than 36 years, patients with anovulatory cycle, failure of > 6 cycles of ovulation induction and women with tubal cause of infertility, after tubal surgery for > 2 years in women < 36 years and for >1 year in woman > 36 years were included in the study.Patients with known congenital uterine abnormalities, genital infection, prior normal hysteroscopic findings < 2 years ago, past history of major cervical surgery and history of pelvic Koch were excluded from the study. A complete detailed history including demographic details was taken. After complete general physical, systemic examination and basic blood investigations, all the included cases underwent TVS followed by hysteroscopy in the post menstrual phase. After a quick pelvic survey, uterine cavity was assessed in the midline sagittal plane. On the same day, hysteroscopy was done using 4mm Karl-Storz(Germany) rigid Hysteroscope. Specific note of any focal lesion was made.

STATISTICAL ANALYSIS

Data were entered in Microsoft Excel Spreadsheet and later imported to SPSS version 19 (Statistical Package for Social Sciences (SPSS) IBM Corp. Released 2010 [IBM SPSS Statistics for Windows, version 19. 0. Armonk, NY, USA: IBM Corp.] for further analysis. Collected data was analyzed by using chi-square test and ANOVA.

RESULTS

A total of 100 cases of infertility were studied to know the role of combined TVS and hysteroscopy in the evaluation of infertility. Of these cases, 73% patients had primary infertility(PI) and 27% patients had secondary infertility(SI). The baseline demographic details of the participants including residence, religion, occupation, literacy status and socioeconomic status are presented in Table 1. The patients were divided into 4 age groups 21-25, 26-30, 31-35, 36-40 years. Majority of patient with PI were in the age group of 26-30 years (43%) and those with SI in 31-35years (48.1%). 27% cases with PI presented in the age group of 21 to 25 years, 24%cases in the age group of 31 to 35 years, 6% cases in 36 to 40 year of age group. In the study, majority of the patients with PI presented with the duration of 1-3 years (67.1%) while with SI (55.6%) cases belonged to 4-6years group. In the PI group, 21% presents with the duration of 4-6years, 9.6% cases 7-10 years,1.4% cases >10 years duration. In SI group 21% presented with 4-6 years, 7.4% with 7-10 years duration and 3.7% with > 10 years of infertility. Most of the patients included in the study both with PI and SI had normal regular menstrual cycles (73.9% and 77.7% respectively), most common menstrual abnormality was light menstrual bleeding 12.3% patients with PI and 11.1%patients with SI, followed by intermenstrual bleeding and heavy menstrual bleeding. 33.3% cases of SI had pervious history of vaginal delivery, 25.9% patients had Caesarean delivery, 22.3% of them had previous two miscarriages and 18.5% had previous one miscarriage. Out of 100 cases in the study 59% patients had normal TVS findings, 18% cases had PCOS, 11% cases had hydrosalpinx and 11.1% of them had fibroid uterus (Table 2). In the study, most common uterine factor found on TVS in both primary infertility and secondary infertility was endometrial polyp accounting 30% and 33% cases respectively, 10.9% patients with primary infertility and 7.4% of patients with SI had submucosal fibroid,1.3% patients with PI had Mullerian anomaly (Table 3). The most common intrauterine pathology found in the present study on hysteroscopy was endometrial polyp effecting 39.7% and 18.5% of patients with PI and SI respectively, followed by submucosal fibroid effecting 30.13% and 11.1% of patients. 14.8% pts with SI had intrauterine adhesions but not seen in any patient with PI (Table 4). Statistical analysis showed that there was no significant difference between hysteroscopic findings in PI and SI. When evaluated with TVS alone, in 62% of patients no intra uterine pathologies were detected whereas on hysteroscopic examination only 18% patients had normal intrauterine cavity, which is quite less when compared with TVS. When used together,

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only in 5.4% of patients no intrauterine pathology was detected. Hysteroscopy alone could detect pathologies in 82% patients but TVS alone could detect pathologies in only 37.7% of patients. Combination of TVS and hysteroscopy could detect pathologies in 95.5 % of patients (Table 5).It was observed that sensitivity, specificity, PPV, NPV and accuracy of TVS were 82.05%, 72.73%, 91.43%, 66.33%, 80% while that of hysteroscopy were 92.74%, 97.8%,100%, 86%, 92% respectively. Hysteroscopy and TVS when combined together for evaluation of intrauterine pathologies, the sensitivity, specificity, PPV, NPV and accuracy increased to 98.65%, 100%, 100%,97.89% and 95% respectively (Table 6).

Table 1: Distribution of participants according to their demographic profiles (*n*=100)

Residence	
Urban	65
Rural	35
Occupation	
Working	63
Non-Working	37
Educational status	
Illiterate	9
High school	11
Graduate	60
Post graduate	20
Socio-economic status	
Lower	0
Lower middle	17
Upper middle	65
Upper	18
Age	
21-25	24
26-30	40
31-35	29
36-40	7

Table 2: Transvaginal USG findings in participants

	Primary Infertility		**Secondary Infertility**		**Total**	
TVS finding	**Number of Patients**	**%**	**Number of Patients**	**%**	**Number of Patients**	**%**
Normal	**46**	**63**	**13**	**48**	**59**	**59**
PCOS	**14**	**19.1**	**4**	**14.8**	**18**	**18**
Fibroid	**8**	**11.1**	**4**	**15**	**12**	**12**
Hydrosalpinx	**5**	**6.8**	**6**	**22.2**	**11**	**11**

Table 3: Uterine factors in TVS

	Primary Infertility		**Secondary Infertility**		**Total**	
Uterine factor	**Number of Patients**	**%**	**Number of Patients**	**%**	**Number of Patients**	**%**
Normal	**18**	**24.65**	**13**	**48.14**	**31**	**31**
Endometrial polyp	**29**	**39.7**	**5**	**18.51**	**34**	**34**
Submucous Fibroid	**22**	**30.13**	**3**	**11.11**	**25**	**25**
Intrauterine adhesion	**0**	**0**	**4**	**14.81**	**4**	**4**
Cervical stenosis	**-**	**0**	**2**	**7.4**	**2**	**2**
Septate Uterus	**2**	**2.7**	**0**	**0**	**2**	**2**
Unicornuate Uterus	**2**	**2.7**	**0**	**0**	**2**	**2**

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Table 4: Intrauterine factors as in Diagnostic Hysteroscopy

Uterine factor	Primary Infertility		Secondary Infertility		Total	
	Number of Patients	%	Number of Patients	%	Number of Patients	%
Normal	42	57.5	16	59.2	58	58
Endometrial polyp	22	30.13	9	33.3	31	31
Submucous Fibroid	8	10.9	2	7.4	10	10
Unicornuate Uterus	1	1.3	-	-	1	1
Uterine synechiae	0	0	0	0	0	0

Table 5: Comparison between hysteroscopy and TVS USG forintrauterine pathologies

Diagnostic modality	Normal			Abnormal		
	Total	PI	SI	Total	PI	SI
TVS alone	58	42	16	13	48	59
Hysteroscopy alone	31	18	13	69	51	18
Combined	31	18	13	69	51	18

Table 6: Accuracy rates of hysteroscopy and TVS USG

	TVS	Hysteroscopy	TVS and Hysteroscopy
Sensitivity	82.05	97.24	98.65
Specificity	72.73	97.8	100
PPV	91.43	100	100
NPV	66.33	86	97.89
Accuracy	80	92	95

DISCUSSION

In the present study, out of 100 cases of infertility, PI was seen in73% cases and SI in 27% cases respectively. Similar results were found in Kale PS et al[11] and Shah et al[12] where observation of PI was more common than SI. However, in study done by Zhang et al[13], the prevalence of PI and SI was almost equal. It was observed that the duration of infertility (years) in maximum number of cases of PI group was 1-3 years (67.1%) whereas in SI group, maximum duration of infertility was 4-6 years (42.9%). Majority of the patients in our study had normal menstrual cycles (75%). 12% of patients with infertility had light menstrual flow followed by 9% of patients with intermenstrual bleeding and only 4% patients presented with heavy menstrual flow. These results obtained in our study were comparable with the study done by Mali et al.[14] In the present study on TVS, 58% participants had normal findings. Endometrial polyp was the most commonly found pathology on TVS in 31% of patients, followed by submucosal fibroid in 10% of patients. The results are comparable with Chayanis Apirakviriya et al[15] and Marzieh Shiva et al[16]wherein endometrial polyp was seen in 28% and 12.6% cases followedby submucosal fibroid in 11% and 9% of cases respectively. However, a study conducted by Maryam Niknejadi et al[17]stated that submucosal fibroid was the most common uterine abnormality found on TVS (23%) followed by endometrial polyp in 16.7% of cases. The percentage of normal hysteroscopic findings in SI group of our study was in close range with Ragni et al[18] , Maryam Niknejadi et al[17] and Nanaware et al[19]. In case of SI group, 48.14% of patients were found to have normal finding, however study conducted by Chanu et al[20] reported approximately 81-92% of normal findings in both PI and SI. Cervical stenosis was observed only in 1.1% patients in a study conducted by Chanu et al[20] study whereas in the present study, it was observed in 7.4% of patients with SI. In this study, 4% of patients with PI had uterine anomalies on hysteroscopy and no anomaly was found in SI group. These results are comparable with the similar were the results obtained in Nanaware et al[19] study where 70 % patients with PI and 66.67% patients with SI has normal hysteroscopic findings. In our study, we found endometrial polyp more in PI than in SI group and same results are seen in Ragni et al[18].

The sensitivity of TVS from the present study was calculated to be 82.05% which was comparable with Maryam et al[17], Ragni et al[18] and Mansoureh Vahdat et al[21].These studies too showed a better sensitivity of 79%, 91% and 93.5% respectively. NPV of TVS in the study was 66.33% and was comparable to the results of Mansoureh Vahdat et al[21] and Maryam et al[17] studies. In this study, sensitivity of hysteroscopy in finding an abnormality inside the uterus in patients of infertility was found to be 92.74%. Similar results were reported by Marzieh Shiva et al[16]wherein it was found it to be 94%. However, Abo Bakr A.et al [22] and Mohammed A Kandee et al[23] reported higher sensitivity of around 98% and98.8% respectively. Similarly specificity of hysteroscopy in finding an intra uterine abnormalitycalculated from the study was 97.8% which was close to result obtained in MarziehShiva et al[16] and Mohammed A Kandee et al[23]95% and 99.7% respectively.

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CONCLUSION

TVS is a sensitive, low cost and non invasive tool to find out any pelvic pathology in patients of infertility. As far as uterine evaluation is concerned, hysteroscopy proves to be more sensitive tool. However, if both are used together the diagnostic yield in terms of sensitivity and specificity is still higher.

Conflicts of Interest: None

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