

DIAGNOSTIC ACCURACY OF HYSTEROSONOGRAPHY AGAINST TRANSVAGINAL ULTRASOUND IN DIAGNOSIS OF ENDOMETRIAL LESIONS IN PATIENTS PRESENT WITH ABNORMAL UTERINE BLEEDING TAKING HYSTEROSCOPY AS GOLD STANDARD

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ABSTRACT

OBJECTIVE: To evaluate the diagnostic accuracy of hysterosonography against transvaginal ultrasound in diagnosis of uterine lesions by taking hysteroscopy as gold standard. **DESIGN:** Cross sectional study. **PATIENTS AND METHODS:** This study was conducted in Department of Radiology, at Bolan Medical Complex Hospital, Quetta from 1st July 2018 to 30th April 2019. Women presented with history of abnormal uterine (AUB) bleeding were included in this study. Pregnancy was ruled out by transabdominal scan. Transvaginal ultrasound and hysterosonography were performed in all the patients. All the data were coded and analyzed using SPSS version 21. **RESULTS:** 446 patients who underwent transvaginal ultrasound (TVUS), hysterosonography (HSG), and hysteroscopy as part of their gynecological investigations. For endometrial polyps, TVUS shows sensitivity 60.53%, specificity 97.06%, positive predictive value (PPV) 95.83%, and negative predictive value (NPV) 68.75% while HSG shows sensitivity 95%, specificity 97.14%, PPV 97.44%, and NPV 94.44%. For submucous leiomyoma, TVUS shows sensitivity 57.14%, specificity 93.48%, PPV 84.21%, and NPV 78.18% while HSG shows sensitivity 96.55%, specificity 100.00%, PPV 100.00%, and NPV 97.92%. **CONCLUSION:** Diagnostic efficacy of HSG is superior to TVUS for the diagnosis of endometrial polyps and submucous fibroids. HSG should be considered as an intermediate investigation after TVUS to assess intracavity pathology and to confirm the diagnosis; hysteroscopy should become a therapeutic intervention.

Keywords: Hysterosonography (HSG), Transvaginal ultrasound (TVUS), Uterine Lesions, Abnormal Uterine bleeding.

Introduction

Female patients of all age groups can presents with one of frequent complaint like abnormal uterine bleed.¹ In past approximately 33% of women referred to gynecologists presented with complaints of abnormal uterine bleed. Now this percentage is increased to approximately 69% in premenopausal and post menopausal age groups. Endometrial pathologies

represent 10% of cause post menopausal bleed and is frequently diagnosed on imaginig.² In subfertile population polyps, myomas, synechiae and congenital uterine malformations are common endometrial pathologies with prevalence ranging between 11-45%.³ 10-15% of couples seeking treatment for infertility usually represent with uterine abnormalities

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as main underlying etiology.⁴

Prior to the introduction of assisted reproductive technique (ART) Transvaginal ultrasonography was being routinely used for over decades. However, certain pathologies involving uterine cavity (Polyps, Submucosal myomas, Synechiae) the diagnostic yield of TVUS is low.^{5,6} There are high chances that endometrial and uterine pathologies could be easily missed on TVUS in 10-30% of infertile and asymptomatic women.⁷ Therefore the mainstay of Hysterosonography was to aid more benefits in detection of those conditions which are easily missed on TVUS. The method of HSNHG involves the infusion of normal saline through the endocervical canal into the uterine cavity which aids better visualization of uterus cavity. HSNHG provides sensitivity and specificity rates of 98% and 83%, respectively, and positive and negative predictive values of 96% and 91%, respectively.⁶

Aided benefit of HSG is its cost effectiveness as it is two to nine times less expensive than diagnostic hysteroscopy. HSG can easily replace hysteroscopy in 84% of the cases. It can also along with endometrial biopsy can replace hysteroscopy as a gold standard in detection of uterine abnormalities according to some authors.⁸

The mainstay of HSG is the detection of uterine cavity of women suffering from abnormal pre and post menopausal bleed, polyps, myomas or synachiae.⁹ In presence of focal or diffuse endometrial thickening or compromised TVUS images, HSG is indicated as a complementary tool, as it provides better visualization of uterine cavity by instilling a liquid medium.¹⁰

In comparison to hysteroscopy, HSG proved to be less cost effective, less invasive and in also less painful.¹¹⁻¹³ One of the benefits of HSG is that it also represented to improve the success rates of ART cycles and decreases the rates of cycle cancellation and embryo implantation failures. It is also indicated as investigation of choice for women undergoing IVF treatment.⁶

The purpose of this study is to evaluate the benefits of HSG in population suffering from abnormal uterine bleeding. All patients underwent pelvis ultrasounds and those with inconclusive results further investigated on TVUS as 1st line of investigation.¹ HSG also plays a pivotal role and was introduced by Nannini et al. in 1981.¹⁴

As it is already mentioned that HSG utilizes instillation

of a liquid medium (e.g., normal saline) so it provides better visualization of uterine cavity Endometrial thickness, heterogeneity, underlying etiology of abnormal endometrial thickness are better evaluated in comparison to TVUS.¹⁵

Rationale of this study is to further focus and further develop the role of sonohysterography which is more sensitive and more specific than transvaginal ultrasonography in diagnosis of endometrial polyps and submucosal fibroids.

Material and Methods

This comparative study was conducted in Department of Radiology at, Bolan Medical Complex Hospital, Quetta from 1st July 2018 to 30th April 2019. The study was duly approved by ethical review committee. 100 women of the age group 20 to 66 years with mean age of 38.79 ± 7.68 (Standard deviation), presented with history of abnormal uterine bleeding (menorrhagia, dysmenorrhoea, intermenstrual bleeding, irregular bleeding) were included in this study. Pregnancy was ruled out by transabdominal scan. Informed consent was taken. The age, symptoms, medical history and clinical findings of all the patients were recorded. Transvaginal scan as well as hysterosonography was performed in all patients and findings were recorded.

The patient was placed in the lithotomy position. Cervix was cleaned using piodene solution and speculum was inserted. Cervical os was localized and cleaned with piodene solution. Foleys catheter of size 5 to 7 French was inserted through the os and was inflated using 2 ml of normal saline and speculum was removed. A standard transvaginal ultrasound was inserted alongside the catheter and 10 to 20 ml of normal saline was instilled into the endometrial cavity.

The following variables were assessed in both TVUS and HSG. Endometrial thickness > 8 mm, presence of submucosal fibroid, presence of intramyometrial fibroid and presence of endometrial polyp. Hypoechoic lesions altering the endometrial cavity were considered submucosal fibroid. Hypoechoic lesions in the myometrium were considered intra myometrial fibroid. Hyperechoic lesions within the endometrial cavity were considered as polyp. TVUS and HSG were

performed by the single senior consultant radiologist with experience of more than five years. It was performed in TOSHBA Ultrasound machine using 6.5MHZ multi frequency transvaginal probe. Both the TVS and HSG were performed by consultant radiologist. The patients were followed up after respective surgeries. The histopathological analysis of the lesions was done in the Pathology Department and the histopathology reports were considered as the gold standard. All the findings were collected in a predesigned proforma. The data were coded and analyzed using SPSS version 20. The sensitivity, specificity, positive predictive value, negative predictive value, false positive and false negative were calculated.

Results

Out of 446 patients whose records were examined, 26 were excluded due to incomplete data; 420 patients were included in this analysis. 152 patients underwent hysteroscopy due to suspected intracavity lesions on HSG and uterine cavity lesions were confirmed in 148 patients (Tab. 1). There were no documented complications during or after the HSG procedure in this study. The HSG procedure was completed successfully in 99.52% of patients.

Intracavity Lesions	Numbers
Asherman's syndrome	4
Endometrial polyp	76
Endometrial polyp plus Submucous fibroid	4
IUCD	4
Polypoid endometrium	8
Submucous fibroid	52
Total	148

Table 1: Intracavity lesions confirmed by hysteroscopy.

TVUS was "normal" in 64 patients. However, 18 of these were found to have intracavity pathology on HSG (cervical polyp: 2, endometrial polyp: 8, submucous fibroid: 4, and Asherman's syndrome: 4). Four women were diagnosed with intrauterine adhesions (Asherman's syndrome) by HSG although the TVUS failed to identify this problem in all four cases. Four women who were investigated for intermenstrual bleeding were found to have anterior isthmic defects

(a consequence of previous lower segment caesarean section (LSCS) by HSG as the cause for their intermenstrual bleeding. All of these isthmic defects were not identified by TVUS.

The diagnostic efficacy of TVUS and HSG for the diagnosis of endometrial polyps and submucous fibroids were calculated by the validation tests shown in (Tab. 2).

		TVS 95% CI		HSGM 95% CI	
Endometrial polyps	Sensitivity	60.53%	43.39% to 75.96%	95.00%	83.08% to 93.39%
	Specificity	97.06%	84.67% to 99.93%	97.14%	85.08% to 99.93%
	Positive PV	95.83%	78.88% to 99.89%	97.44%	86.52% to 99.94%
	Negative PV	68.75%	53.75% to 81.34%	94.44%	81.34% to 99.32%
Submucous Fibroids	Sensitivity	57.14%	37.18% to 75.54%	96.55%	82.24% to 99.91%
	Specificity	93.48%	82.10% to 98.63%	100.00%	92.45% to 100.00%
	Positive PV	84.21%	60.42% to 96.62%	100.00%	87.66% to 100.00%
	Negative PV	78.18%	64.99% to 88.19%	97.92%	88.93% to 99.95%

Table 2: Validation tests for TVS and HSGM for the diagnosis of endometrial polyps and submucous fibroids

For the diagnosis of endometrial polyps, TVUS showed a sensitivity of 60.53%, specificity of 97.06%, and positive predictive value (PPV) and negative predictive value (NPV) of 95.83% and 68.75%, respectively. HSGM showed a sensitivity of 95%, specificity of 97.14%, PPV 97.44%, and NPV 94.44%. For the diagnosis of submucous leiomyoma, TVUS showed a sensitivity of 57.14%, specificity 93.48%, PPV 84.21%, and NPV 78.18%, whereas HSG showed a sensitivity of 96.55%, specificity 100.00%, PPV 100.00%, and NPV 97.92%. (Fig. 1a) shows thickened endometrium on TVS which comes out to be submucosal fibroid on sonohysterography (Fig. 1b).



Figure 1a: TVS shows thickened endometrium fibroid.

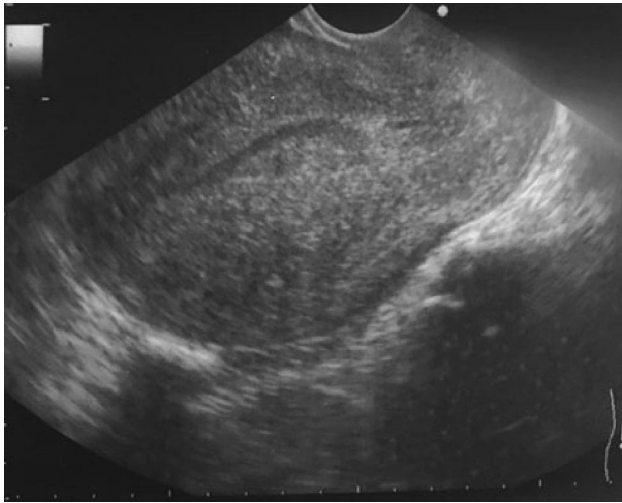


Figure 1b: Sonohysterography shows submucosal outlined by saline.

Discussion

This study clearly proves that HSG procedure represented less failure rates in comparison to TVUS in another published study which demonstrated failure rate of approximately 7%. It also represents HSG to be highly sensitive and specific along with positive and negative predictive values in detection of endometrial polyps and submucosal fibroids when comparison with TVUS is made.¹⁶

Other authors also came to a conclusion about endometrial polyps as the most ubiquitous pathology in agreement to this study (12.5%).⁷ Other studies documented that submucous myomas (18.1%) were found to be more prevalent than endometrial polyps (13.6%).⁴

Other authors documented decreased prevalence of uterine pathologies, in comparison to endometrial polyps and myomas seen in 5% and synechiae in 1.7% of patients respectively.¹⁷ A study enrolled 241 nonfertile women to evaluate the presence of endometrial polyps. Enrolled patients underwent HSG and hysteroscopy simultaneously, and the sensitivity, specificity, accuracy and error in the detection of endometrial polyps by HSG were 97.3%, 95.8%, 96.2%, and 3.7%, respectively.¹⁸ Positive and negative predictive values were 91.1% and 98.7%, respectively. The interobserver agreement between HSG and hysteroscopy combined with histopathology examination was very high, indicating that HSG is a safe and highly sensitive and specific method to diag-

nose endometrial polyps in comparison to hysteroscopy alone. All but one of the women suspicious of having endometrial polyps submitted to hysteroscopy had their diagnoses confirmed in this study.

A comprehensive evaluation of diagnostic hysteroscopy in abnormal uterine bleeding¹⁹ inferred that the sensitivity and specificity of hysteroscopy in diagnosing endometrial polyps was 0.94 (95% CI 0.92 to 0.96) and 0.92 (95% CI 0.91 to 0.94), respectively. While for determining submucosal myomas, the sensitivity was 0.87 (95% CI 0.81 to 0.92) with a specificity of 0.95 (95% CI 0.93 to 0.97). The effectiveness of hysteroscopy in their study is commiserating to the findings for HSG and it can therefore come to a conclusion that HSG is as fruitful as hysteroscopy in detection of endometrial polyps and submucosal fibroids. Other studies also supported this.²⁰

As stated earlier, HSG has the advantages of being less invasive, less expensive and is associated with less patient discomfort. An additional specification is that the lesions can be easily quantified by measurements and the position of the lesions can be accurately determined, relative to the myometrium.²¹ Other uterine and pelvic structures (Ovaries, lower uterine segment, both adnexas) can also be demonstrated at the same sitting during an HSG examination.

The use of the sonolucent medium within the uterine cavity facilitates the choice of evidence-based treatment options. For example, the length of the uterine septum of up to 1 cm may not need any surgical correction to improvise reproductive outcomes.²² This can be accurately evaluated during HSG but not quite as easily or readily while performing TVUS alone.

4 isthmic defects as a major cause of abnormal uterine bleed were evaluated by HSG and these were all missed on prior TVUS examination. This is extremely significant in diagnosing the underlying cause and for the precise management of these patients and, in these cases, the accurate diagnosis was only achieved through by HSG.

HSG procedure was well tolerated by all enrolled patients. Out of 420, only 2 procedures were forsaken due to patient's discomfort. It proved to be less inconvenient to the patients in comparison to hysteroscopy as they were able to carry on with their normal daily routine immediately after the procedure.

We came to conclude that the efficaciousness of HSG in detection of submucosal fibroids and endometrial polyps is as convincing as hysteroscopy. Although keeping in view of “see and treat” option leads in terms of hysteroscopy (as both an outpatient and inpatient procedure) and is more costly than HSG²³ and is also more invasive.

The question arises that why an invasive option is preferred which causes discomfort, associated with increased rates of complications as well as increased cost when the same results can be obtained by a less invasive technique earlier. As mentioned earlier HSG should be considered as an intermediate procedure, before commencing on hysteroscopy. Results show that application of the HSG technique in the evaluation of abnormal uterine bleeding will significantly reduce hysteroscopy for determining endometrial and uterine pathologies. There is one limitation in our study that is number of cases which can be higher and results can be more in favor of sonohysterography.

Conclusion

Comparison between TVUS and HSG represents that diagnostic accuracy of HSG is far more superior to TVUS, more specifically in diagnosis of submucosal fibroids and endometrial polyps. Aided benefit of HSG is that it can be used as an alternative tool for diagnostic hysteroscopy. This study clearly represents the benefits of HSG being less cost effective, less invasive, no perforation risk, less chances of discomfort. However it should be considered as a leading investigation after TVUS for better visualization of uterine abnormalities, while hysteroscopy should be served in terms of therapeutic intervention.

Conflict of Interest: Declared none.

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