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Original Article

The comparison of transvaginal ultrasonography and hysteroscopy in women with abnormal uterine bleeding: A single center experience

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Abstract

Aim: The aim of this study is to compare the diagnostic accuracy of transvaginal ultrasonography and hysteroscopy in the detection of intracavitary abnormalities that presented with abnormal uterine bleeding.

Material and Methods: 216 women with uterine bleeding involve in this study. In this retrospective study, the diagnostic accuracy of transvaginal ultrasonography and hysteroscopy were compared to their corresponding pathology results in both prepostmenopausal (n:145) and postmenopausal (n:71) women. To compare these three methods more reliably, we used Kappa analyses.

Results: In postmenopausal group with endometrial polyp and myomas; sensitivity of transvaginal ultrasonography is 68.2% to 40% dilatation & curettage, specificity is 33.3% to 97% and Kappa value is 0.016 to 0.407. Sensitivity of hysteroscopy is 97.7% to 40% dilatation & curettage, specificity is 74.1% to 100% and Kappa values is 0.75 to 0.553. Specificity of transvaginal ultrasonography is 98.3% to hysteroscopy, specificity of transvaginal ultrasonography is 98.1% to dilatation & curettage, sensitivity of hysteroscopy is 47.1% and specificity is 90.7% to dilatation & curettage and Kappa value is 0.411 with normal patients in the same group.

Conclusion: In postmenopausal patients transvaginal ultrasonography has a high chance of detecting when there is an endometrial pathology. Transvaginal ultrasonography is not sensitive enough to use solely in order to exclude polyps and fibroids in abnormal uterin bleeding. Therefore, hysteroscopy can be applied even if transvaginal ultrasonography is normal in these patients.

Keywords: Abnormal uterine bleeding; endometrial fibroid; endometrial polyp; hysteroscopy; ultrasound.

INTRODUCTION

Abnormal uterine bleeding (AUB) is the most common gynecological symptom and complaint in gynecological outpatients and occurs in women of all ages (1). Endometrial pathologies underlie a large proportion of AUB both during the reproductive years and after menopause. The pathologies include variants of the normal endometrium and benign, premalignant, and malignant conditions (2). In 2011, AUB etiologies were categorized using the PALM-COEIN criteria (polyps, adenomyosis, leiofibroid tissue, malignancies or hyperplasia, coagulopathies, ovulatory dysfunctions, endometrial causes, iatrogenic causes, and "not yet classified") (3). The greatest diagnostic challenge is to distinguish patients who require medical treatment from those with organic lesions who must undergo surgery. Although transvaginal ultrasonography (TVUS) is commonly the first tool used to diagnose AUB, recent studies found that hysteroscopy (HS) identified lesions that TVUS may miss (4,5). Many physicians now believe that new-generation HS should be first used for diagnosis (4,6). Also, the diagnostic options differ between prepostmenopausal and postmenopausal women. Therefore, we used a kappa analysis to compare the diagnostic performances of TVUS and HS in prepostmenopausal and postmenopausal women with AUB.

MATERIAL and METHODS

This retrospective study was performed at the Department of Obstetrics and Gynecology of Şişli Hamidiye EtfalTraining and Research Hospital, Istanbul, Turkey, from January 2011 to January 2013. This study

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was approved by the hospital ethics committee (Ethical approval number: 349).

The data was obtained by screening patient files and hospital database. The inclusion criteria were women who presented to our clinic with active vaginal bleeding in reproductive period; and no history of hysteroscopy, curettage, or ovulatory dysfunction. A total of 216 women with AUB were recorded. The patients were divided into two groups: menopausal (n:71) and prepostmenopausal (n:145). Menopause was defined as the absence of menstrual periods for 1 year. The exclusion criteria were any vaginal or cervical pathology, genital infection/pelvic inflammatory disease, pregnancy, hormonal treatment (combined oral contraceptive/hormone replacement therapy), a former diagnosis of endometrial pathology, hyperplasia or a malignancy, and/or coagulopathy on placement of an intrauterine device.

All transvaginal ultrasound of women were performed using a 5-MHz vaginal probe (GE Logiq P5 ultrasound). The sonographic technique was standardized as follows in our clinic. The bladder was emptied and the patient placed in the lithotomy position; the coronal and sagittal views of the uterus were enlarged to fill 75% of the screen; and the cervix, cervical canal, uterine cavity, and ovaries were then examined. The endometrium and surrounding myometrium were evaluated in terms of cavity configuration, any mass, and the relationship of any mass (if present) to the endometrial cavity. The endometrial thickness was measured (in mm) at the mid-sagittal uterine plane (near the fundus). Measurement commenced at the basal layer of the anterior wall of the uterine cavity and ended at the basal layer of the posterior wall. The endometrium was >13 mm thick in prepostmenopausal women and >4 mm thick in postmenopausal women. Values above these indicated a thickened endometrium. Intrauterine pathologies (including fibroids and polyps) and their locations were recorded.

As hospital procedure, operative HS was performed under sedoanalgesia by a single operator supervised by an endoscopy expert. Hysteroscopy was performed with the aid of a 5-mm 30°- angled hysterescope (Karl Storz, Germany). The uterine cavity was distended using Resectosol solution and intrauterine pressure to a maximum of 80–100 mmHg applied automatically using an electronic irrigation/suction device (Hamou Endomat; Karl Storz). During HS, the uterine cornu; tubal ostia; uterine fundus; and the lateral, anterior, and posterior uterine walls were systematically examined. All HS findings were documented on a dedicated form. The cervical canal and endometrium were explored, and any structural anomaly recorded. A resectoscope (7.5 mm in diameter; Karl Storz) was used to resect fibroids and endometrial polyps. Endometrial sampling followed; samples were placed in formalin prior to inspection by a pathologist. The pathology data were grouped as fibroids, polyps, or atrophy. A verdict of "normal" indicated that both the secretory and proliferative endometria were free of pathologies. The diagnostic accuracies of TVUS and HS were compared (by reference to the pathology data) in both prepostmenopausal and postpostmenopausal women.

Statistical Analysis

All analyses were performed with the aid of SPSS software ver. 18 for Windows (IBM Corp., Armonk, NY, USA). The Kolmogorov-Smirnov test was used to explore the normality of the distribution. Categorical data were compared using the chi-squared or Fisher's exact test. Numerical variables were compared using the independent samples t-test or Mann-Whitney U test. A p-value <0.05 was taken to reflect statistical significance. Diagnostic accuracies were evaluated by calculating sensitivity, specificity, and positive and negative likelihood ratios. The kappa test was used to explore the extents of agreement.

RESULTS

We retrospectively analyzed data from 216 women 71 postmenopausal and 145 prepostmenopausal, in Sisli Etfal Research and Training Hospital. The mean age of women was 48.1± 1.0 years. Table 1 compares the ultrasound findings to the HS and endometrial biopsy data. Of postmenopausal women diagnosed with endometrial polyps by TVUS, HS showed that 73% in fact had polyps, 63% endometrial and 6% fibroid; 25% had a normal endometrium. Patients in whom the endometrial cavity was normal on TVUS were diagnosed with endometrial polyps via both HS (100%) and pathology (100%). In postmenopausal women, only 25% of HS anomalies described as myomas had been described as fibroids by TVUS. Pathology showed that 50% were in fact myomas. In prepostmenopausal women in whom TVUS diagnosed endometrial polyps, HS revealed that 71% had polyps and 3% myomas; 25% were normal. Pathology diagnosed 69% of women with endometrial polyps, 2% with fibroids, and 25% as normal. Only 67% of prepostmenopausal patients normal on TVUS were also normal on HS; pathology showed that 50% had endometrial polyps. In prepostmenopausal women, 64% of anomalies diagnosed as myomas by HS were diagnosed as fibroids by TVUS; 50% were myomas (Table 1).

Table 2 compares the HS findings with those of endometrial biopsy. Of postmenopausal and prepostmenopausal patients diagnosed with endometrial polyps by HS, 86% and 87%, respectively, in fact had polyps. Pathology showed that 62% of all postmenopausal patients and 72% of prepostmenopausal patients who were normal on HS were also normal on biopsy. All postmenopausal patients and 54% of prepostmenopausal patients diagnosed with fibroids by HS also exhibited fibroids on biopsy. Of prepostmenopausal patients diagnosed with fibroids by HS, 23% were normal on biopsy (Table 2).

In postmenopausal women with endometrial polyps and fibroids, the TVUS sensitivity was 40– 68.2% that of dilatation and curettage (DC), and the specificity was 33.3–97%. The sensitivity of HS was 40–97.7% that of DC, and the specificity was 74.1–100%. The overall specificity of TVUS was 98.1% that of DC, but 90.7% for normal postmenopausal patients (Table 3). In prepostmenopausal women with endometrial polyps and fibroids, the sensitivity of TVUS was 77.8–88% that of DC, and the specificity was 30.2–94.9%. In prepostmenopausal women, the sensitivity

of HS was 77.8–88% that of DC, and the specificity was 77.4–95.6%. In normal prepostmenopausal women, the specificity of TVUS was 96.3% that of DC, and the specificity was 89.8% (Table 3).

Table 1. Sequences of comparative diagnoses by TVUS versus HS and dilatation curettage

		HYSTEROSCOPY		PATHOLOGY					
		POSTMENOPAUSE (n:71)	PREMENOPAUSE (n:145)	POSTMENOPAUSE (n:71)	PREMENOPAUSE (n:145)				
TVUS		N	% of Group	N	% of Group	N	% of Group	N	% of Group
Thickened endometrium	Endometrial polyp	13	72%	5	71%	12	67%	7	100%
	Normal	3	17%	2	29%	5	28%		
	Atrophy	2	11%			1	6%		
	Total	18	100%	7	100%	18	100%	7	100%
Endometrial polyp									
	Endometrial polyp	35	73%	84	71%	30	63%	81	69%
	Endometritis							4	3%
	Endometrial fibroid	1	2%	4	3%	3	6%	2	2%
	Normal	9	19%	30	25%	12	25%	30	25%
	Atrophy	3	6%			3	6%	1	1%
	Total	48	100%	118	100%	48	100%	118	100%
Normal	Endometrial polyp	1	100%	2	33%	1	100%	3	50%
	Normal			4	67%			2	33%
	Endometritis							1	17%
	Total	1	100%	6	100%	1	100%	6	100%
Endometrial	Endometrial polyp	1	25%	2	14%	1	25%	2	14%
fibroid	Endometrial fibroid	1	25%	9	64%	2	50%	7	50%
	Normal	1	25%	3	21%			5	36%
	Atrophy	1	25%			1	25%		
	Total	4	100%	14	100%	4	100%	14	100%

TVUS: Transvaginal Ultrasonography, HS: Hysteroscopy, N,n: Number

Table 2. Sequences of comparative diagnoses by HS versus dilatation curettage

		POSTMENOPAUSE (n:71)		PREMENOPAUSE (n:145)	
HYSTEROSCOPY	PATHOLOGY	N	% of Group	N	% of Group
Endometrial Polyp	Endometrial Polyp	43	86%	81	87%
	Endometrial Fibroid	2	4%	3	3.5%
	Normal	5	10%	6	6%
	Endometritis			3	3.5%
	Total	50	100%	93	100%
Normal	Endometrial Polyp	1	8%	9	23%
	Endometrial Fibroid	1	8%		
	Normal	8	62%	28	72%
	Atrophy	3	23%	1	3%
	Endometritis			1	3%
	Total	13	100%	39	100%
Endometrial	Endometrial Polyp			2	15%
Fibroid	Endometrial Fibroid	2	100%	8	62%
	Normal			3	23%
	Total	2	100%	13	100%
Atrophy	Normal	4	67%		
	Atrophy	2	33%		
	Total	6	100%		

HS: Hysteroscopy, N,n: Number

Table 3. Analyzing of sensitivity, specificity, positive and negative likelihood ratio and kappa of patients with abnormal uterine bleeding according to their diagnosis

		Postmenopause (n:71)				Premenopause (n:145)			
		Diagnose	Lower CI	Upper CI	Kappa p	Diagnose	Lower CI	Upper CI	Kappa p
TVUS Polyp /Hysteroscopic Polyp	Sensitivity	70.0%	57%	83%	.079	90.3%	84%	96%	.279
	Specificity	38.1%	17%	59%	.506	34.6%	22%	48%	.000*
	+LR	1.13	0.77	1.66		1.38	1.12	1.70	
	-LR	0.79	0.39	1.57		0.28	0.14	0.58	
TVUS Polyp /Pathological Polyp	Sensitivity	68.2%	54%	82%	.016	88.0%	81%	95%	.203
	Specficity	33.3%	16%	51%	.895	30.2%	18%	43%	.007*
	+LR	1.02	0.73	1.43		1.26	1.04	1.53	
	-LR	0.95	0.48	1.90		0.40	0.20	0.79	
TVUS Myom/Hysteroscopic Myom	Sensitivity	50.0%	-19%	119%	.307	69.2%	44%	94%	.632
	Specficity	95.7%	91%	100%	.006*	96.2%	93%	99%	.000*
	+LR	11.50	1.95	67.76		18.28	7.19	46.46	
	-LR	0.52	0.13	2.09		0.32	0.14	0.72	
TVUS Fibroid/Pathological Fibroid	Sensitivity	40.0%	-3%	83%	.407	77.8%	51%	105%	.577
	Specficity	97.0%	93%	101%	.001*	94.9%	91%	99%	.000*
	+LR	13.20	2.33	74.93		15.11	6.78	33.68	
	-LR	0.62	0.30	1.27		0.23	0.07	0.80	
Hysteroscopic Polyp /Pathological Polyp	Sensitivity	97.7%	93%	102%	.750	88.0%	81%	95%	.657
	Specficity	74.1%	58%	91%	.000*	77.4%	66%	89%	.000*
	+LR	3.77	1.99	7.14		3.89	2.35	6.43	
	-LR	0.03	0.00	0.22		0.15	0.09	0.27	
Hysteroscopic Fibroid/ Pathological Fibroid	Sensitivity	40.0%	-3%	83%	.553	77.8%	51%	105%	.608
	Specficity	100.0%	100%	100%	.000*	95.6%	92%	99%	.000*
	+LR	17.63	7.48	41.53		17.63	7.48	41.53	
	-LR	0.60	0.29	1.23		0.23	0.07	0.79	
TVUS Normal/Hysteroscopic Normal	Sensitivity				-.027	10.3%	1%	20%	.114
	Specficity	98.3%	95%	102%	.634	98.1%	96%	101%	.025*
	+LR					5.44	1.04	28.51	
	-LR	1.02	0.98	1.05		0.91	0.82	1.02	
TVUS Normal/Pathological Normal	Sensitivity				-.027	5.4%	-2%	13%	.023
	Specficity	98.1%	95%	102%	.572	96.3%	93%	100%	.654
	+LR					1.46	0.28	7.64	
	-LR	1.02	0.98	1.06		0.98	0.90	1.07	
Hysteroscopic Normal/ Pathological Normal	Sensitivity	47.1%	23%	71%	.411	75.7%	62%	90%	.643
	Specficity	90.7%	83%	98%	.000*	89.8%	84%	96%	.000*
	+LR	5.08	1.92	13.48		7.43	4.12	13.39	
	-LR	0.58	0.37	0.92		0.27	0.15	0.48	

TVUS: Transvaginal Ultrasonography, N: Number
+LR: Positive likelihood ratio,-LR: Negative likelihood ratio,CI : Confidence interval
*p<0,005, Kappa test significance

DISCUSSION

The TVUS kappa value for endometrial polyps was low in postmenopausal patients; TVUS failed to diagnose polyps and fibroids. Also, the diagnostic accuracy of TVUS was doubtful for women of all ages, especially when no organic pathology was evident in the endometrial cavity.

The identification of such pathologies is important in terms of diagnostic accuracy and surgical decision-making. Both TVUS and HS are convenient and effective tools used to evaluate the physiology/pathology of the uterine cavity (7). TVUS is much more acceptable to most obstetricians and gynecologists, being simple, inexpensive, minimally invasive, and relatively well-tolerated by patients. HS is considered much more invasive and costly, but better diagnoses endometrial disorders (8). Although the diagnostic accuracies of various methods used to evaluate AUB remain controversial, recent large-scale studies have shown that the sensitivity and specificity of HS are higher than those of TVUS (5). The techniques have been recently compared using PALM criteria; HS is clearly superior.

Several studies have shown that HS is superior to TVUS is terms of diagnosing endometrial polyps (4,6,9). We found that TVUS sensitivity and specificity were lower than those of HS. In postmenopausal women, the TVUS specificity was 33% in terms of diagnosing endometrial polyps and the kappa value 0.016. The HS kappa value was 0.750. In prepostmenopausal patients, the TVUS specificity was also lower, but the kappa value 0.203, which is unimpressive. As emphasized in other studies (6,10), the chosen diagnostic method for endometrial polyps is strongly influenced by the experience of the professional. Our study is also retrospectively designed, it is likely to be affected by this situation. Unfortunately, we did not distinguish endometrial polyps by diameter; it is possible that polyps over a certain diameter could be reliably evaluated using TVUS. Further work is necessary. However, it is impossible to ensure the accurate diagnosis of endometrial polyps using TVUS only, especially in postmenopausal patients; if symptoms are present, HS is required to exclude polyps.

Previous studies suggested that patients normal on TVUS were also normal on HS (4). We found otherwise; in postmenopausal patients, no patient who was normal on TVUS was normal on pathology—all had endometrial polyps. The kappa value of TVUS for those with normal cavities was –0.027; thus, TVUS and pathology were in near-total disagreement. In prepostmenopausal women, the situation was somewhat better. A recent analysis (5) supports our findings. However, in postmenopausal patients, only 62% of those considered normal on HS were normal on pathology. Two HS diagnoses were false-negatives (2/13, 16%); one (8%) patient had an endometrial polyp, and one (8%) an endometrial fibroid. The HS sensitivity in terms of a normal cavity in postmenopausal patients was 47% and the kappa value 0.41; the latter value improved for prepostmenopausal women. When TVUS failed to reveal an endometrial pathology, independent of age, we misdiagnosed endometrial polyps. This may reflect the low number of patients. However, as no larger study has yet presented kappa values, no comparisons are possible. Endometrial sampling should be performed even if the interior of the cavity appears normal; no lesser currently available test is adequate.

Grimbizis et al. (11) reported that the diagnostic performance of TVUS in terms of fibroid detection was poor. At all ages, almost half of patients diagnosed with fibroids via TVUS were misdiagnosed. Previous reports suggested that HS was the most reliable method for the evaluation of endometrial fibroid status (10). Our data differ. Particularly, only 54% lesions identified as endometrial fibroids by HS were pathologically confirmed in prepostmenopausal women; the figure for postmenopausal women was 100%. The kappa values of TVUS and HS in terms of endometrial fibroid detection were surprisingly similar, independent of age. More data are required; an additional diagnostic method might be useful.

Our study has several strengths; we divided patients into prepostmenopausal and postmenopausal groups. Previous studies explored the sensitivity, specificity, and positive and negative predictive values afforded by TVUS and HS in terms of PALM diagnoses at all ages (4,6). We assessed test success rates via kappa analysis, which has been but rarely applied in this context; kappa analysis reveals within-group diagnostic distributions. Also, we compared the TVUS and HS data to the pathology results. The fact that we evaluated the accuracies of TVUS and HS in both prepostmenopausal and postmenopausal patients renders our findings realistic and reliable. In addition, when we consider that the most common pathological results of women with postpostmenopausal bleeding in our country is endometrial polyps, we think that our findings are valuable (12).

Our study has certain limitations. First, our study was retrospective. Second, we did not non-invasively confirm our findings. No patient was subjected to saline infusion sonography, three-dimensional sonography, or magnetic resonance imaging. Çöğendez and et al. made sonohysterography for patients with endometrial pathology (13). Third, we did not include patients with hyperplasia or malignancies. If these cause AUB, the diagnostic utility of HS may not be adequate, especially in postmenopausal patients.

CONCLUSION

In conclusion, the diagnostic success rates of various modalities differ in AUB patients, depending on their age and the pathology in play. TVUS may fail to detect endometrial polyps and fibroids, especially in postmenopausal patients; TVUS alone cannot reliably exclude organic causes of AUB. Thus, in suspect cases, HS should be performed even if TVUS is normal. HS affords great benefits in routine clinical practice, allowing the evaluation of intrauterine lesions. Additional prospective studies with larger populations are required to validate our observations.

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