

Comparison of Endometrial Polyp Characteristics in Transvaginal Sonography and Hysteroscopy in Predicting Endometrial Malignancies in Premenopausal and Postmenopausal Women

Safoura Rouholamin, Parisa Irannezhad, Maryam Hashemi

Department of Obstetrics and Gynecology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

Abstract

Background: Hysteroscopy is known as the gold standard for endometrial polyps diagnosis and its findings on vascularity, size, and number of polyps can indicate malignancy, but it is a relatively expensive method with some complications. Ultrasound is a common part of the gynecological examination, and with technological advances, its ability to predict pathological outcomes has increased. This study aimed to determine the accuracy of ultrasound in diagnosing the characteristics of endometrial polyps.

Materials and Methods: This diagnostic value study was performed on 300 premenopausal and postmenopausal women over 40 years of age with endometrial polyps referred to Alzahra and Beheshti hospitals in Isfahan. The characteristics of endometrial polyps were evaluated by transvaginal ultrasonography and hysteroscopy and biopsy specimens were sent for pathological evaluations.

Results: In this study, 103 premenopausal women and 197 postmenopausal women were evaluated. Malignancy was confirmed by pathology in 4 premenopausal women (2%) and 2 postmenopausal women (2%). In both hysteroscopy and ultrasound methods, the frequency of vascularity was significantly different in postmenopausal and premenopausal women, but the other features of the polyp were not significantly different in them. Ultrasonic sensitivity in detecting the presence of vascularity, polyps larger than 1.5 mm, more than 1 polyp, and the presence of pedicle were 39.04, 57.38%, 91.93 and 94.95%, respectively, its specificity were 98.94, 36.47, 99.57 and 98.89% respectively.

Conclusion: A comparison of the characteristics of polyps in both ultrasound and hysteroscopy methods shows that hysteroscopy has been more effective in diagnosing malignancy and ultrasound has not have acceptable sensitivity in diagnosing size and vascularity.

Keywords: Endometrial neoplasms, hysteroscopy, malignancy, medical sonography, menopause, polyps, postmenopause

Address for correspondence: Dr. Maryam Hashemi, Department of Obstetrics and Gynecology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran.

E-mail: maryam.hashemi88@gmail.com

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INTRODUCTION

Endometrial polyp refers to localized overgrowths and pathological hypertrophy of endometrial tissue^[1] with a prevalence of 10-40% in women with abnormal uterine bleeding, but it is 12% in asymptomatic women.^[2,3] Most endometrial polyps are benign and endometrial hyperplasia and carcinoma

have been reported rarely.^[4] Indications for polyp surgery are included multiplicity, more than 1.5 cm in size, and evidence of malignancy on postmenopausal sonography.^[5] In the process of diagnosis and treatment of endometrial polyps, the distinction between benign and malignant is very important.^[5] Diagnostic hysteroscopy is known as the gold standard for diagnosing

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endometrial polyps and may be used to identify the size, location, number of polyps, regularity of their surface, and the appearance of small blood vessels on the surface of the polyp.^[6] In cases of suspected malignancy, a conservative uterine biopsy or polypectomy is necessary.^[7] Studies have shown that hysteroscopic findings of increased vascularity may indicate the risk of endometrial polyp malignancy, but the superiority of this method over sonography in determining the likelihood of malignancy as well as its sensitivity is controversial and requires further studies.^[8] Due to the complications and limitations of hysteroscopy, including the cost of surgery, complications of anesthesia, the possibility of infection and perforation of the uterus,^[9] This study aimed to compare the sonography results with hysteroscopy to achieve the sensitivity of the sonography feature compared to hysteroscopy and achieving the reliability of this para clinical method.

MATERIALS AND METHODS

This prospective study was performed on 300 women over 40 years of age before and after menopause with a diagnosis of endometrial polyps who were referred to the gynecology and obstetrics clinic of Alzahra and Beheshti hospitals in Isfahan from April to March 2020. Inclusion criteria were being older than 40, non-pregnant, being in the premenopausal or postmenopausal phase, having abnormal uterine bleeding, diagnosis of polyps on sonography, having surgical indications, having willingness to participate in the study, and having no surgical contraindications. After explaining the research and getting written consent from the patients according to the instructions of the Isfahan University of medical Sciences' Ethics Committee (code MUI.MED.REC.1398.500), transvaginal sonography (Philips brand ultrasound device, made in the Netherlands-USA and C9-2 MHz and C5 probes (1 MHz) was performed by a radiologist and the characteristics of the polyp including the number, size, location, base, and vascularity for each patient were recorded in a special form containing the demographic information. All of these patients underwent diagnostic hysteroscopy (a hysteroscopic device with specifications) by a gynecologist and all samples were sent to a pathologist for examination and investigated by a pathologist who was unaware of the physical characteristics of the samples. It should be noted that during the study, the patient's names and information were kept confidential and they were examined according to their assigned codes. Finally, the data were statistically analyzed by SPSS20 statistical software and the sensitivity, specificity, and positive and negative predictive value of sonographic findings were determined in comparison with hysteroscopic findings.

RESULTS

In the present study, the characteristics of endometrial polyps in sonography and hysteroscopy in predicting uterine malignancies in premenopausal and postmenopausal women were investigated. Out of 300 subjects, 103 (43.3%) were in the

premenopausal, and 197 (65.7%) were in the postmenopausal phase. The characteristics of the studied women are shown in Table 1. A comparison of the diagnostic features of polyps in the two groups of premenopausal and postmenopausal women is shown in Table 2. In sonographic findings, the size, base, and number of polyps were not significantly different between postmenopausal and premenopausal women, but vascularity was significantly different ($P < 0.05$) and in postmenopausal women (20.4%) it was significantly more than premenopausal women (10.7%). In hysteroscopic findings, the size, base, and number of polyps in the two groups of postmenopausal and premenopausal women were not significantly different, but vascularity was significantly different (46.6 and 29.9%, $P < 0.05$, respectively).

Regarding the pathological results of the studied samples, as shows, out of 300 subjects, 6 (2%) had malignant results, and in each of the pre- and postmenopausal groups, there was 2% malignancy [Table 3]. The pathological characteristics of women with malignancy are shown in Table 4. As can be seen, out of 6 women diagnosed with malignancy, 3 (50%) had vascular hysteroscopy, while sonography did not detect vascularity in any of them. Also, in both techniques, 5 patients (83.3%) had a polyp size greater than 1.5.

According to the results of Table 5, the sensitivity of sonography in the diagnosis of vascularity was 39.04%, 57.38% in polyp size, 91.93% in number, and in the presence of polyp base it was 94.95%, which indicates its high sensitivity in diagnosing the number of polyps more than one and their bases. In addition, the specificity of sonography in diagnosing the presence of vascularity was 98.94, 36.47% in the size of the polyp, 99.57% in the number of polyps, and in the presence of the base it was 98.89%, which is acceptable in all cases except in case of the polyp size.

DISCUSSION

In the present study, which aimed to compare the characteristics of endometrial polyps on sonography and hysteroscopy in predicting endometrial malignancies in premenopausal and postmenopausal women, 103 premenopausal women and 197 postmenopausal women were included.

According to the results of this study, polyp sizes more than 1.5 cm were shown greater with sonography than

Table 1: Basic characteristics of the studied women

Variable		Perimenopause frequency (%)	Post menopause frequency (%)	Total frequency (%)
Desire for Pregnancy	No	63 (61.2)	197 (100)	260 (86.7)
	Yes	40 (38.8)	0 (0)	40 (13.3)
Infertility	No	73 (70.9)	197 (100)	270 (90)
	Yes	30 (29.1)	0 (0)	30 (10)
Mean age (mean±SD)		44.58±2.76	56.99±5.83	48.84±7.17

Table 2: Diagnostic characteristics of polyps in comparison with sonography and hysteroscopy in premenopausal and postmenopausal women

Variable		Sonography			P	Hysteroscopy			P
		Perimenopause frequency (%)	Post menopause frequency (%)	Total frequency (%)		Perimenopause frequency (%)	Post menopause frequency (%)	Total frequency (%)	
Vascularity	-	176 (89.3)	82 (79.6)	258 (86)	0.02*	138 (70.1)	55 (53.4)	193 (64.3)	0.004*
	+	(10.7) 21	21 (20.4)	42 (14)		59 (29.9)	48 (46.6)	107 (35.7)	
Size	>1.5	42 (21.3)	21 (20.4)	63 (21)	0.85	107 (53.4)	52 (50.5)	159 (53.0)	0.52
	<1.5	155 (78.7)	82 (79.6)	237 (79)		90 (45.7)	51 (49.5)	141 (47.0)	
Size (mean±SD)		1.90±0.46	2.00±0.74	1.94±0.57	0.84	1.76±0.53	1.88±0.69	1.80±0.59	0.29
Number	1	158 (80.2)	84 (81.6)	242 (80.7)	0.90	153 (77.7)	85 (82.5)	238 (79.3)	0.07
	2	36 (18.3)	18 (17.5)	54 (18.0)		27 (13.7)	16 (15.5)	43 (14.3)	
	<2	3 (1.5)	1 (1.0)	4 (1.3)		17 (8.6)	2 (1.9)	19 (6.3)	
Base	-	121 (61.4)	64 (62.1)	185 (61.7)	0.90	115 (58.4)	65 (63.1)	180 (60.0)	0.42
	+	76 (38.6)	39 (37.9)	115 (38.3)		82 (61.4)	38 (36.9)	120 (40)	

*Indicates a significant difference at the level of $P < 0.05$

Table 3: Pathological findings in premenopausal and postmenopausal women

	Result	Perimenopause frequency (%)	Post menopause frequency (%)	Total frequency (%)	P
Pathology	Polyp	193 (98.0)	101 (98.1)	294 (98)	0.83
	carcinoma	(2) 4	(2) 2	(2) 2	

Table 4: Pathological Characteristics of women with malignancy

Variable	Number	Frequency (%)
Age (mean±standard deviation)		47.71±7.43
Endometrial thickness (mean±standard deviation)		07/2±5/14
Number of pregnancies	0	2 (3/33)
Number of births	2	1 (6/16)
History of cesarean section	3	2 (3/33)
Menopausal condition	5	1 (6/16)
High blood pressure	0	2 (3/33)
Diabetes	2	3 (50)
Dyslipidemia	5	1 (6/16)
History of breast cancer		2 (3/33)
Abnormal uterine bleeding (AUB)		2 (3/33)
Variable		1 (6/16)
Age (mean±standard deviation)		2 (3/33)
Endometrial thickness (mean±standard deviation)		0 (0)
Number of pregnancies		6 (100)
Existence of vascularity	Sonography	0 (0)
	Hysteroscopy	3 (50)
Existence of polyp base	Sonography	0 (0)
	Hysteroscopy	0 (0)
The number of polyps of more than 1	Sonography	1 (6/16)
	Hysteroscopy	1 (6/16)
The size of the polyp of more than 1.5 cm	Sonography	5 (3/83)
	Hysteroscopy	5 (3/83)

hysteroscopy (79 vs. 47%) as well as less vascularity (14 vs. 35.3%), but other characteristics such as the number of polyps

and the presence of a base were similar in the two methods. Sensitivity and specificity evaluation by the relevant formulas also showed that sonography compared to hysteroscopy was less sensitive in the diagnosis of vascularity and polyp size but in detecting the number and presence of polyp base, its sensitivity was higher (91.93% and 94.95%, respectively), which confirms the results. In addition, sonography had a high specificity in the diagnosis of vascularity, the number of polyps, and the base of the polyp (98.94, 99.57 and 98.89%, respectively), but its specificity was low in the diagnosis of polyp size.

In a number of studies, the accuracy of sonography in the diagnosis of endometrial polyps and their malignancies has been evaluated, but often its efficiency has not been considered sufficient and the use of hysteroscopy in abnormal cases has been suggested. In a study by Wanderley *et al.* (2016) on 134 patients, hysteroscopy showed a diagnostic accuracy of more than 90% in the diagnosis of endometrial polyps, while transvaginal sonography showed a 65.9% accuracy in polyps' diagnosis, which confirms the present findings regarding lower sensitivity and specificity of sonography compared to hysteroscopy.^[10] However, in the study of Alcázar *et al.* (2003), a higher sensitivity of up to 89% and 87% was obtained when using color ultrasound and diagnosis of the nutrient vessels.^[11] In a study of 789 premenopausal women by Shiva *et al.* (2018) it revealed that hysteroscopy had a sensitivity of 94% and a specificity of 95% in the diagnosis of endometrial polyps, while transvaginal ultrasonography had a sensitivity of 54% and a specificity of 80%, respectively, which is consistent with our results, indicating less sensitivity and specificity of sonography.^[12] In a study by Režňák and Kudela (2018), the

Table 5: Results of sensitivity, specificity, positive and negative predictive value of sonography in comparison with hysteroscopy in determining the polyp characteristics in premenopausal and postmenopausal women

Variable		Vascularity %	Larger size than 1.5%	More than 1%	Base + %
Sensitivity	Premenopausal	34.48	55.48	88.63	92.50
	Postmenopausal	43.75	49.75	100	100.00
	Total	39.04	57.38	91.93	94.95
Specificity	Premenopausal	99.28	36.11	100.00	99.13
	Postmenopausal	100.00	36.53	98.82	98.64
	Total	98.94	36.47	99.57	98.89
Positive predictive value	Premenopausal	95.23	55.48	100.00	98.66
	Postmenopausal	100.00	59.75	94.73	97.50
	Total	97.61	57.83	96.27	98.26
Negative predictive value	Premenopausal	78.97	92.85	96.83	95.04
	Postmenopausal	67.07	90.47	100.00	100.00
	Total	59.49	92.06	97.93	96.75

success rate of sonography in predicting endometrial polyps was 65.1% and the agreement between sonography and hysteroscopic/histopathological findings was 72%. Finally, it was stated that sonographic examination is not reliable for assessing intrauterine masses and suspicious ultrasound findings should be followed by hysteroscopy with targeted sampling and histopathological examination^[13] Grimbizis *et al.* observed 41.8% sensitivity and 83.6% specificity in the diagnosis of endometrial polyps using sonography. Researchers have not been able to distinguish between benign, precancerous, and malignant focal lesions using sonography.^[14] Kelekci *et al.* (2005) stated that transvaginal sonography in the diagnosis of uterine anomaly has a sensitivity of 56.3% and specificity of 73%.^[15] In the present study, in line with the Grimbizis and Kelekci study, sonography had low sensitivity (39.04%) and high specificity (98.94%) in the diagnosis of vascularity. However, its sensitivity and specificity were high in detecting the number and base of polyps.

In another study, Vitner *et al.* reported that sonography was less sensitive and specific in diagnosing polyps and fibroids than hysteroscopy, and more sensitive and specific in diagnosing pregnancy remnants. In addition, sonography showed the same sensitivity as hysteroscopy (92% vs. 93%) and less specificity (58% vs. 67.7%) in the diagnosis of malignancy.^[7] The higher sensitivity of sonography in the diagnosis of malignancy in Vitner's study compared to other studies could be due to differences in the type and model of the device and the experience of the operator, all of which affect the performance of the ultrasound device. However, they noted that sonography can be used with high accuracy in some cases, such as suspected cases of retained products of conception, but in other cases, hysteroscopy is still needed for accurate diagnosis.

In general, based on the present results as well as the results of other studies, it seems that sonography is not a reliable method to evaluate the characteristics of endometrial polyps and their malignancy and it is recommended to perform the hysteroscopic evaluation in symptomatic women. In support of this theory, Godoy *et al.* suggested that symptomatic women

should undergo hysteroscopic resection. In asymptomatic women, the decision to treat hysteroscopy should be based on the size of the polyp, the presence of risk factors for malignancy, the general clinical condition, and the patient's expectation of medical treatment.^[16]

Pathological results of the studied samples also showed that 6 out of 300 patients participating in the study had malignancies, 4 of which were premenopausal (2%) and 2 were postmenopausal (2%). Consistent with the findings of Preuthipan *et al.*, 2.9% of 240 female endometrial polyps were diagnosed as malignant, with 2.1% being premenopausal and 3% postmenopausal.^[17] In Lieng *et al.*'s study of 411 patients diagnosed with polyps, the prevalence of malignant tumors and endometrial hyperplasia was 3.2% in symptomatic women and 3.9% in asymptomatic women, which is similar to the present study.^[18] In the study of Shor *et al.* (2019) on 556 women undergoing hysteroscopy for endometrial polyp resection, the prevalence of malignancy was 4.7%,^[8] which is probably due to differences in the study population and the indications for polyp resection. In other studies, the prevalence of precancerous and malignant lesions in endometrial polyps was estimated to be 2.67 and 1.54%^[19] and 12.9 and 0.8%,^[20] respectively. Other studies have confirmed the association of uterine *papillary serous carcinoma* with endometrial polyps, especially in larger and symptomatic cases.^[21]

In the present study, women with malignant pathological findings had a mean age of 47.71 ± 7.43 years. 33.3% had a history of cesarean section, 33.3% had high blood pressure, 16.6% had diabetes and 33.3% had dyslipidemia and all (100%) had abnormal uterine bleeding. In the study by Shor *et al.* (2019) on women with endometrial polyps who were diagnosed with malignancy (24 patients), history of cesarean section 12.9%, hypertension 48.4%, diabetes 19.4%, dyslipidemia 16.1% and abnormal bleeding was 76%,^[8] which was somewhat similar to the present results.

In the present study, out of 6 women diagnosed with malignancy, 3 (50%) had vascularity in hysteroscopy, while

ultrasound did not detect vascularity in any of them. Also, in both techniques, 5 patients (83.3%) had a polyp size greater than 1.5. The number of polyps more than 1 in both methods was 1 case (16.6%). In the study of Shor *et al.* (2019), hysteroscopy estimated the prevalence of vascularity in women with a diagnosis of malignancy of 51.6% and in women without malignancy 5.7%, which were significantly different. The number of polyps greater than 1 was 35.5% in women with malignancy and 25.5% in women without malignancy, which was significantly different. However, the size of the polyp in women with and without malignancy was not significantly different (22.2 and 20.3 mm, respectively).^[8] In the present study, due to the small number of patients diagnosed with malignancy, it was not possible to compare the polyp characteristics in the two groups with and without malignancy, but it was clear that vascularity cases and polyp sizes greater than 1.5 cm were higher in women with malignancy. It should be noted that vascularity and polyp size greater than 1.5 in all patients studied ($n = 300$) by hysteroscopy were 35.7 and 47%, respectively. In the present study, although the final pathology results in only 6 patients (2%) was malignant, based on the comparison of all the studied characteristics of the polyp in both sonography and hysteroscopy, it seems that hysteroscopy has been more effective in diagnosing malignancy.

Comparison of diagnostic characteristics of polyps in premenopausal and postmenopausal women showed that in both hysteroscopy and sonography techniques, the size, base, and number of polyps in the postmenopausal and premenopausal women were not significantly different, but vascularity was significantly different, and it was more significantly higher in postmenopausal women than premenopausal women. In the study of Kanthi *et al.* (2016), the size and number of polyps in postmenopausal women were significantly higher than in premenopausal women.^[20] In another study by Reslova *et al.*, the presence of multiple polyps were reported in 26% of postmenopausal women and 15% of premenopausal women, with significant differences.^[22] However, in the study of Preutthipan and Herabutya, it was observed that the average size of polyps in premenopausal women with 3.4 cm is significantly higher than in postmenopausal women with 2.5 cm. In addition, multiple polyps were not significantly different between the two groups of premenopausal and postmenopausal women (71.6 and 84%, respectively).^[17] The results of the present study show that there is no significant difference in the number of polyps in the two groups of premenopausal and postmenopausal women, which is consistent with the findings of Preutthipan and Herabutya,^[17] but is not consistent with the other two studies. In summary, the higher accuracy rate of hysteroscopy in comparison with ultrasonography for the diagnosis of endometrial polyps in postmenopausal women, suggests that sonographic evaluation may not be able to identify the endometrial lesion. The predominant element of endometrial polyps' diagnosis is still the evaluation of the cavity through direct viewing. On the other hand, it is impossible to ensure the

exact diagnosis of endometrial polyps by only ultrasonographic images.^[23] The observed differences between studies can be due to differences in the research populations in terms of environmental and genetic factors as well as the tools used to determine the polyp characteristics and the skill and experience of the device operator. Other results of the present study showed that the sensitivity of sonography in diagnosing the polyp characteristics in postmenopausal women is somewhat higher than in premenopausal women, but their specificity is almost similar.

CONCLUSION

The results of the present study showed that sonography was very accurate in diagnosing the number of polyps and the presence of a base, but was not accurate in diagnosing vascularity and polyp size. Therefore, it seems that sonographic examination is not a reliable method for evaluating endometrial polyps and suspected and symptomatic cases should be followed by hysteroscopy.

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Conflicts of interest

There are no conflicts of interest.

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