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Original article

Hysteroscopy vs. transvaginal ultraultrasonography in the diagnosis of endometrial lesions

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Abstract

Background: Abnormal uterine bleeding (AUB) is the most common gynecological problems that many factors are involved in its creation. Two common methods used to diagnose uterine lesions are vaginal ultraultrasonography and hysteroscopy. The aim of this study was to evaluate the diagnostic value of transvaginal ultraultrasonography and hysteroscopy in the diagnosis of intrauterine lesions leading to the AUB.

Methods: A cross-sectional study was performed on 203 premenopausal post-menopausal women with complaints of abnormal uterine bleeding. A transvaginal ultraultrasonography was performed from the eligible subjects. In the second visit, a hysteroscopy was done and during the hysteroscopy procedure an endometrial biopsy was obtained from all the women. Pathology was considered as the gold standard and sensitivity, specificity, positive predictive value and negative predictive value were calculated for both methods using the Cat maker software.

Results: The mean age of 203 patients who precipitated in this study was 43.1±2.7. Leiomyoma was the most common leading cause of abnormal uterine bleeding (36%). Sensitivity, specificity, positive predictive value and negative predictive value of ultraultrasonography in the diagnosis of intrauterine lesions were 74.2%, 49.75%, 71.9% 54.3%, respectively and for hysteroscopy were 91.67%, 86%, 85.9% and 88.7, respectively.

Conclusion: Hysteroscopy results were more consistent with the results of pathology and it was more accurate than transvaginal ultraultrasonography in the diagnosis of intrauterine lesions leading to the AUB.

Keywords: Abnormal uterine Bleeding, Hysteroscopy, Transvaginal, Ultraultrasonography

Introduction

Abnormal uterine bleeding is identified by changes in the pattern or volume of bleeding, and it is the most common gynecological problems before and after menopause (1), which compose one-third of obstetricians visits (2, 3). About 70% of women with abnormal uterine bleeding have benign lesions (4). The main purpose of investigating abnormal uterine bleeding is to rule out clinically significant

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pathological conditions, such as endometrial cancer and hyperplasia (5).

In the past, mainly diagnosis of intrauterine abnormalities was performed by diagnostic dilatation and curettage endometrial (6). It is generally agreed that there are three methods to assess cavity of the uterin among the women with problem AUB including transvaginal ultrasonography, hysteroscopy, and uterine pathology. Many investigators showed that these methods have some advantages and disadvantages with their own accuracy (6-8). Transvaginal ultrasonographyisa for evaluation is a minimal-invasive diagnostic method for diagnosis of AUB (9, 10). There is evidence which shows that hysteroscopy is not only a tool for early diagnosis and but also is a specialized surgical technique for postmenopausal bleeding (11, 12). Today's trend is towards minimally-invasive examinations using outpatient endometrial biopsy, ultrasound scan and Hysteroscopy (13); however due to its limited availability, it is impossible to perform this procedure in many medical center. This study aimed to obtain accuracy of diagnostic methods, and to determine sensitivity, specificity, positive predictive value and negative predictive value of transvaginal ultrasonography than endometrial hysteroscopy for the detection of diagnosis of abnormal uterine bleeding in women problem of AUB.

Materials and Methods

This cross-sectional study was performed on 203 women with complaints of abnormal uterine bleeding, premenopausal post-menopausal bleeding, whose referred to at Ayatollah Rouhani and Shahid Yahya nejad hospitals, Babol, Iran. The ethical Committee of the Babol University of Medical Sciences approved the study. Informed written consent was obtained from all subjects before their inclusion in the study.

After obtaining history and clinical examination a transvaginal ultraultrasonography was performed using a 7.0 MHz vaginal probe transducer from the eligible subjects. In the second visit, a hysteroscopy was done using a 3.6 mm single channel flexible hysteroscope and during the hysteroscopy procedure an endometrial biopsy was obtained from all the women. Appearance of endometrium was categorized as irregular endometrium, normal endometrium, hyperplasia, and carcinoma. If there was any problem or focal lesion, it was assessed and categorized as adhesion, indistinct mass, endometrial polyp, and myoma.

All patients with pelvic infection, cervical cancer, pregnancy, coagulation disorders, consuming anticoagulant drugs and had primary or secondary infertility, were excluded.

All patients information included age, parity, number of deliveries and abortions, menstrual cycle regularity, patient complaint, examination of the uterus, cervical examination, vaginal ultrasound findings, treatment prior to hysteroscopy, hysteroscopic findings, and pathologic findings, which were all inserted in a data sheet. The obtained information were entered into SPSS 20 software to compare the diagnosis of transvaginal ultrasonography and hysteroscopy, correlation between age, number of pregnancies, abortions and before and after menopause, and eventually Chi- square test was used to evaluate the results of pathologic diagnosis by factors such as age, number of pregnancies, the number of deliveries and abortions; and Cat maker software was used to calculate the sensitivity, specificity, positive and negative predictive values. P value less than 0.05 was considered significant.

Results

Out of the total 296 patients with abnormal uterine bleeding seen at gynecologic clinics, 296 excluded; thus 203 patients met the inclusion criteria, 140 patients (68.9%) had premenopausal bleeding and 63 patients (31.0%) had post-menopausal bleeding.

The mean patient age was 43.1±2.7. Of 203 patients, 30 cases (14.7%) were nulliparous, 70 cases (34.4%) primiparous and 103 (50.7%) were multiparous. Based on the results of Transvaginal ultrasonography, irregular endometrium, myoma, polyps, unknown masses and adhesions were the most common abnormal findings, respectively. Based on the results of hysteroscopy, myoma, irregular endometrium, polyps and unknown masses were the most common abnormal findings, respectively. No statistically significant difference was observed in age, gravidity, parity and the number of abortions between the ultrasound and hysteroscopy findings. In clinical examination of uterus, the prevalence of normal uterus, uterus enlargement and smaller than normal uterus were 176 (86.7%), 25 (12.3%) and 2 (0.9%); respectively. In clinical examination of cervix, the

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Table 1. Comparison of transvaginal ultrasonography and hysteroscopy with pathology in different lesions

Findings		Endometrial carcinoma N (%)	Hyperplasia N (%)	Polyp N (%)	Myoma N (%)	Normal endometrium N (%)	P-value
Normal Endometrium	TVS *	3(3.3)	6(6.5)	4(43.5)	26(28.3)	17(18.5)	< 0.001
	HYS **	-	6(7/9)	28(36.8)	30(39.5)	12(15.8)	0.145
Irregular endometrium	TVS	-	8(18.2)	16(36.4)	17(38.6)	3(6.8)	0.480
	HYS	-	2(28.6)	1(14.3)	3(42.5)	1(14.3)	0.545
Myoma	TVS	-	10(31.2)	5(15.6)	12(37.5)	5(15.6)	0.031
	HYS	1(1.5)	15(22.4)	22(32.8)	21(31.4)	8(11.9)	0.280
Polyp	TVS	-	4(16.7)	4(16.7)	13(54.2)	3(12.5)	0.293
	HYS	2(3.8)	7(13.5)	16(30.8)	20(38.5)	7(13.5)	0.576
Indistinct mass	TVS	-	2(20.0)	2(20.0)	6(60.0)	-	0.425
	HYS	-	-	-	1(100)	-	1
Adhesion	TVS	-	-	-	1(100)	-	1
	HYS	-	-	-	-	-	-

* TVS: transvaginal ultrasonography, ** HYS: hysteroscopy

diagnosis was normal, myoma, polyps, cervicitis, and nabothian cyst in 109 (53.7%), 25 (12.4%), 35 (17.2%), 30 (14.8%) and 4 (1.9%) respectively. Myoma was the most common pathological diagnosis (36%), polyp (34%), hyperplasia (15%), normal (14%) and endometrial carcinoma was the last one (2%).

Ultrasonography and hysteroscopy diagnosis were compared with pathologic diagnosis, in which there was a significant difference only in the normal endometrium, and myoma in ultrasonography (Table 1). From the total number of 92 (45.3%) cases were diagnosed as normal endometrium byultrasonography, there were 61 normal endometrium, 18 myoma, 12 polyp, and 1 case of unknown mass by hysteroscopy (p< 0.001), (kappa = 0.53), (CC= 0.47). From the total number of 44 cases (21.6%) diagnosed as irregular endometrium by ultrasonography, there were 7 cases of normal endometrium, 28 myoma, 9 polyp by hysteroscopy (p = 0.35), (kappa = 0.06), (CC = 0.09). From the total number of 32 cases (15.7%) of myoma diagnosed by ultrasonography, there were 3 normal endometrial, 3 irregular endometrium, 12 myoma, 14 polyps by hysteroscopy (p = 0.54), (kappa = 0.03), (CC = 0.04). From the total number of 24 (11.8%) polyps diagnosed by ultrasonography, there were 1 irregular endometrial, 8 myoma, and 15 polyps by hysteroscopy (p <0.001), (kappa = 0.27), (CC = 0.29). From the total number of 10 (4.9%) unknown mass diagnosed by ultrasonography, there were 4 normal endometrium, 3 irregular endometrial, 1 (0.5%) myoma, 2 polyps by hysteroscopy (p = 1), (kappa = 0.009), (CC = 0.01). And the only case who had uterus adhesion diagnosis by ultrasonography, had normal endometrium in hysteroscopy (p = 0.48), (kappa = 0.1), (CC = 0.3).

The sensitivity, specificity, positive predictive value and the negative predictive value of transvaginal ultrasonography were 74.2% (CI= 54.9-83.6), 49.75% (CI= 45.6-77.7), 71.9% (CI= 40.1-77.8) and 54.3% (CI= 49.1-73.6), respectively.

The sensitivity, specificity, positive predictive value and the negative predictive value of hysteroscopywere 91.67% (CI= 80.9-97.6), 86% (CI= 80.9-95.6), 85.9% (CI=79.3-93.6) and 88.7% (CI= 75.5-89.16), respectively (Table 2).

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Table 2. Diagnostic value of transvaginal ultrasonography and hysteroscopy compared with pathology in different lesions.

Diagnosis	LR-CI[1] 95%	LR + CI[2] 95%	NPV CI[3] 95%	PPV CI[4] 95%	Specificity CI 95%	Sensitivity CI 95%
Normal endometrium						
TVS	0.90(0.81-1.02)	1.86(0.92-3.78)	57(50-64)	61(43-79)	90(85-96)	18(11-26)
HYS	0.96(0.86-1.08)	1.25(0.63-2.50)	63(56-71)	43(25-61)	87(82-93)	16(8-24)
Myoma						
TVS	0.99(0.74-1.32)	1.02(0.62-1.66)	84(78-91)	16(8-24)	63(56-70)	38(21-54)
HYS	1.14(0.92-1.41)	0.79(52.0-1.19)	64(56-72)	28(18-38)	60(52-69)	31(20-42)
Polyp						
TVS	1.29(1.04-1.58)	0.47(0.19-1.18)	85(79-91)	6(0-12)	65(58-72)	17(2-32)
HYS	1.05(0.84-1.29)	0.91(0.57-1.45)	74(66-81)	24(14-34)	66(59-74)	31(18-43)
Hyperplasia						
TVS	0.94(0.68-1.28)	1.38(0.38-4.99)	95(92-99)	7(-2-16)	85(81-90)	20(-5-45)
HYS	1.17(1.11-1.24)	-	99(98-100)	-	85(80-90)	
Carcinoma						
TVS	1/02(1/00-1/04)	-	78(72-84)	-	98(96-100)	-
HYS	1/02(1/00-1/03)	-	97(94-99)	-	98(97-100)	-

[1]LR-CI95%: Negative (LR−) Likelihood Ratio and their *Confidence Intervals* ,[2] LR + CI95%: Positive (LR+) Likelihood Ratio and their *Confidence Intervals* , [3]NPV CI95%: *negative* predictive value *(NPV)* and their *Confidence Intervals* , [4] PPV CI95%: *Positive* predictive value *(NPV)* and their *Confidence Intervals,* [5] TVS: transvaginal ultrasonography; [6] HYS: hysteroscopy

Discussion

The results of this study showed that hysteroscopy has a higher diagnostic value than transvaginal ultrasonography in the diagnosis of intrauterine pathology leading to AUB. The obtained sensitivity, specificity, positive predictive value, negative predictive value and confidence intervals showed that transvaginal ultrasonographyhas not only lower diagnostic value thanhysteroscopy, but also it does not have acceptable sensitivity and specificity. However, it has a good specificity in diagnosing normal endometrium. In the study of Carlson et al. the sensitivity and specificity of transvaginal ultrasonography in the diagnosis of endometrial lesions were obtained 100% and 75%, respectively (14). The results of present study are consistent with the results of similar studies; in all studies in this area, hysteroscopy had higher diagnostic value than transvaginal ultrasonography.

In a study conducted by Ryu et al. sensitivity of transvaginal ultrasonography in the evaluation of patients with AUB was 79% and specificity of 45.8%, positive predictive value of 83% and negative predictive value of 39.3%, but the sensitivity of hysteroscopy was obtained 95.1%, specificity of 83.3% and positive predictive value of 96.2%, and negative predictive value of 84.8%. The obtained sensitivity and specificity for transvaginal ultrasonography in this study was close to the amount calculated in our study (5).

Markris et al. concluded that hysteroscopy is more reliable in the evaluation of uterine cavity lesions that is consistent with the results of our study (15). In the study of Alborziet al. on 81 cases, same as our study, hysteroscopy showed higher diagnostic value, but the specificity of transvaginal ultrasonography was calculated higher than our study, that due to high positive predictive value (94%), the differences between the two studies can be due to differences in sample size (16).

Baliket al. in a study in 2011on 46 patients found that the sensitivity of transvaginal ultrasonography in the diagnosis of endometrial polyps was 100%, while the specificity was 56.4%; the sensitivity of hysteroscopy was obtained 99.9%, specificity of 100%, andbased on our study, hysteroscopy had higher total performance test results than transvaginal ultrasonography (10).

In the study of Niknejad et al. in 2010, 670 women with AUB were examined; the results showed the sensitivity, specificity, positive predictive value and negative transvaginal ultrasonography in detecting endometrial polyps: 88.3%, 91.9%, 86.6% and 90.8%, respectively; Hysteroscopy had the sensitivity of

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98.9%, specificity of 99.6%, positive predictive value 89.4% and 90.7% negative predictive value, which were consistent with the results of our study (7).

In a study by Aslam et al. in 2007, 100 women with AUB were examined, and the results of their study showed the sensitivity, specificity, positive predictive value and negative transvaginal ultrasonography in the diagnosis of hyperplasia of the endometrium as 61.5%, 79.8%, 81.6% and 89.4%. For hysteroscopy, the sensitivity of 92.9%, specificity of 94.3%, positive predictive value of 89.7%, and negative predictive value of 93.7% (9). In our study, hysteroscopy had also higher reliability in the diagnosis of uterine lesions.

Also, in the study of Nanda et al. in 2002 on patients with abnormal uterine bleeding, sensitivity and specificity of TVS in the diagnosis of myoma were 70% and 99.6%, and the sensitivity and specificity of hysteroscopy were 100 % and 98.9%, respectively (17).

The important point in our study compared to other studies is that diagnostic value of hysteroscopy and transvaginal ultrasonography in the diagnosis of intrauterine lesions was calculated lesions base, which is not investigated in other studies. This is an important issue due to different consequences and treatment of various pathologies. The main disadvantage of this study, considering the high prevalence of AUB, is the sample size; because of incomplete information and lack of access to patient records, no more than 203 patients were available.

Conclusion

Based on the results of this study, sensitivity, specificity, positive and negative predictive value of hysteroscopy were higher than the transvaginal ultrasonographyhas in the diagnosis of polyps, myoma, abnormal endometriosis, and other uterine lesions and according to the obtained compatibility with the pathological results and hysteroscopy, hysteroscopy is suggested as an appropriate and precise method for the diagnosis of uterine lesions.

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Conflict of interest

None declared.

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