

THE CORRELATION BETWEEN UTERINE ARTERY DOPPLER ULTRASONOGRAPHY RESULTS AND ENDOMETRIAL THICKNESS VERSUS HISTOPATHOLOGICAL RESULTS IN WOMEN WITH PERIMENOPAUSAL BLEEDING

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ABSTRACT

Objective: We have aimed at investigating the correlation between uterine artery flow waves and endometrial thickness as well as histopathologic changes in women who presented with either peri or postmenopausal bleeding as transvaginal ultrasonography is obviously less invasive than curettage; the low rate of morbidity or even mortality that exists for curettage is a disadvantage.

Methods: We performed Doppler studies of the uterine artery in 78 women with postmenopausal and perimenopausal bleeding. In all of the patients diagnostic curettage was performed 1 to 7 days after ultrasonography. The curettage material obtained was examined at the Pathology Department of our hospital for histopathologic diagnosis. The specificity and sensitivity of the endometrial thickness and uterine artery resistance index (RI) were evaluated to diagnose the malignant changes of the endometrium.

Results: Fifty-seven women had non-malignant changes and 21 women had malignant changes on histologic examination of the endometrium. Uterine fibroids were detected in 18 women. When malignant changes were detected in the endometrium, uterine artery resistance index was always below 0.80. The mean uterine artery resistance index was significantly lower in the group of women with pathologic changes of the endometrium ($RI=0.706\pm0.085$) compared to the group with non-pathologic changes (0.821 ± 0.072) ($p<0.0005$). In five of six patients with endometrial carcinoma, blood vessels were detected around the myometrium and endometrium by using color flow imaging. Their RI was always less than 0.50. All six women with endometrial carcinoma, but only eleven of 15 women with endometrial hyperplasia, had endometrial thickness greater than 5 mm.

Conclusion: Doppler velocimetry of the uterine artery is useful (100%) for detecting pathologic changes of the endometrium in patients presenting with perimenopausal bleeding. The presence of high resistance in the uterine artery, may allow a more conservative approach in this group of patients.

Key Words: Perimenopausal bleeding, Endometrial histopathology, Doppler velocimetry.

INTRODUCTION

Perimenopausal bleeding is always a definite indication for performing a curettage. Though it may be very low; curettage carries a risk of morbidity or even mortality. Also, discussing the possibility of dilatational curettage causes great anxiety in most of the patients. The histopathologic changes are usually non-malignant in most of the women (80-90%) who present with post or perimenopausal bleeding and the diagnosis usually reached is endometrial atrophy (1). The material obtained by curettage is evaluated by various histopathologic methods to differentiate between malignant or benign changes (2). This kind of evaluation is very valuable for diagnosis.

In some studies, it has been shown that with the histopathological evaluation of material obtained from curettage, diagnosis of hyperplasia or cancer is false negative in about 2-6% of the cases (3-6). This rate has come to light through histopathologic evaluations performed after hysterectomy. These false negative results may be an indication that the uterine cavity has not been adequately curettaged (6).

In some recent studies, endometrial histopathology and uterine ultrasonographic findings have been

compared (7,8). As a result, a correlation has been shown between the malignant changes of the endometrium and ultrasonography performed both transvaginally and transabdominally before curettage.

Transvaginal ultrasonography has a higher flow and therefore provides better resolution. For this reason it is advantageous in the evaluation of the morphologic changes of the pelvic organs (7,8). By using this advantage some researchers have been able to measure the thickness of the endometrium to diagnose pathologies (2,9).

With the introduction of transvaginal color Doppler ultrasonography into gynecology, it has become possible to see the pelvic blood flow in a more detailed fashion (9, 10). The uterine artery and its branches are readily seen by this method and blood flow can be measured by Doppler flow.

In most of the recent studies a correlation has been found between the uterine artery blood flow velocity and the histopathologic diagnosis obtained by curettage from peri or postmenopausal women (11, 12).

Transvaginal ultrasonography is obviously less invasive than curettage; the low rate of morbidity or even mortality that exists for curettage is a disadvantage. For this reason in our study we have aimed at investigating the correlation between uterine artery flow waves and endometrial thickness as well as histopathologic changes in women who presented with either peri or postmenopausal bleeding.

MATERIALS AND METHODS

Seventy-eight patients aged between 40 to 67 who presented to our Gynecology outpatient clinic at Haydarpaşa Numune State Hospital with the complaint of perimenopausal bleeding, constituted the material of our study. None of these patients was receiving hormone replacement therapy. In all of the patients transvaginal color flow Doppler ultrasonography was performed before diagnostic curettage.

For ultrasonography, the device used was Toshiba; Sonolayer SSA-270-A and the transvaginal probe was 6 mHz with a rotation angle of 180°. All the patients were evaluated at the litotomy position with an empty bladder.

The uterus was measured in the longitudinal plane and maximal endometrial thickness could be elicited from this position. The right and left ascendant branches of the uterine artery which are located laterally to the uterine corpus, and the intrauterine vessels were viewed. An example volume was calculated upon the

artery; and pulsed Doppler mode was used to find the blood flow velocity index values. All of these findings were recorded with a colorless Mitsubishi video printer.

Resistance index (RI) is calculated from the flow velocity and is defined as the difference between the peak systolic velocity speed and end diastolic velocity speed divided by peak systolic velocity speed. In our study we measured RI by finding the mean of three good quality consecutive wave forms from each uterine artery.

For statistical data the statistical procedure "Receiver operating characteristics" was used. The cut-off values were RI=0.80 for the uterine artery and 5 millimeters for endometrial thickness.

In all of the patients, diagnostic curettage was performed 1 to 7 days after ultrasonography. The curettage material obtained was examined at the Pathology Department of our hospital for histopathologic diagnosis. The specificity and sensitivity of endometrial thickness and uterine artery RI were evaluated to diagnose the malignant changes of the endometrium.

Student-t test was used to compare differences between various groups. The "p" value below 0.05 was considered statistically to be significant.

RESULTS

In 57 of the 78 women presenting with peri or postmenopausal bleeding, malignancy was not detected by histopathological evaluation of the endometrium. Eighteen patients were diagnosed to have uterine fibroids during the ultrasonographic screening.

Table I shows the distribution of uterine artery RI measures according to endometrial histopathology.

Table I. The distribution of uterine artery RI measures according to endometrial histopathology.

Histopathology	RI<0.80	RI>0.80	Mean RI ± SD
Atrophic endometrium	7	17	0.826 ± 0.094
Proliferative endometrium	7	12	0.815 ± 0.084
Secretory endometrium	2	6	0.834 ± 0.061
Endometrial polip	2	4	0.810 ± 0.049
Non-pathologic changes	18	39	0.821 ± 0.072
Hyperplasia	15	0	0.710 ± 0.082
Endometrium Ca	6	0	0.687 ± 0.099
Pathologic changes	21	0	0.706 ± 0.085 (p<0.0005)
Myoma Uteri	18	0	0.689 ± 0.104 (p<0.0005)

In figure 1, histopathologic results identified by endometrial biopsy are shown.

In addition, table II shows the RI of intrauterine artery and the stage of cancer among patients with endometrial malignancy.

The pathologic changes of the endometrium were evaluated in two groups; one including uterine fibroids and the other excluding them. Uterine artery RI sensitivity and specificity were evaluated separately in these two groups. When the patients with uterine fibroids were excluded, specificity rate increased from a value of 0.68 to 0.92. Sensitivity was high in both groups (100%).

In the diagnosis of pathologic endometrial changes according to endometrial thickness, both sensitivity and specificity were found to be low (Table III and IV).

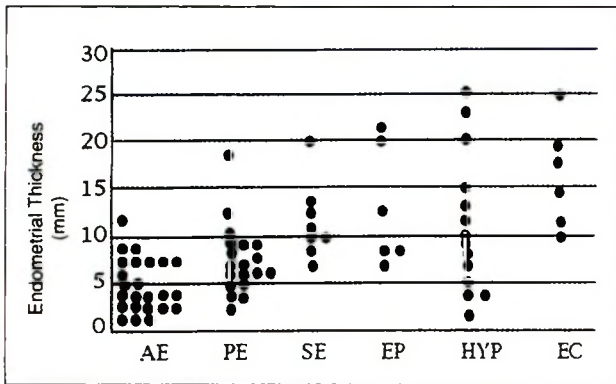


Fig.1: Endometrial histopathology

Table II. RI of intrauterine artery and the stage of Ca among patients with endometrial malignancy

Case number	Stage of Ca	Mean RI ± SD
1	Ia	—
2	IIa	0.40 - 0.60
3	Ib	0.40
4	Ic	0.36
5	Ib	0.39
6	IIb	0.45

Table III. Endometrial thickness according to endometrial changes.

Histopathology	Thickness ≤ 0.5 cm	Thickness ≥ 0.5 cm
Atrophic endometrium	14	10
Proliferative endometrium	4	15
Secretory endometrium	0	8
Endometrial polip	0	6
Hyperplasia	4	11
Endometrium Ca	0	6

Table IV. Sensitivity and specificity of uterine artery RI and endometrial thickness

Histopathology	Sensitivity	Specificity
Uterine artery RI (Including patients with myoma uteri)	1.0	0.68
Uterine artery RI (Excluding patients with myoma uteri)	1.0	0.92
Endometrial thickness	0.72	0.58

DISCUSSION

Eighteen patients with uterine fibroids had lower values of the uterine artery RI compared with the group presenting pathologic histopathologic changes. When the group of patients with uterine fibroids showing normal endometrial changes was excluded, an obvious difference between the RI values appeared. This variation between the group of patients diagnosed with uterine fibroids and the other group consisting of patients with pathologic endometrial changes was found to be to the advantage of the latter.

Endometrial carcinoma was diagnosed in 6 of the patients after endometrial sampling. In five of these six patients, intrauterine blood vessel formation around the endometrium was shown. When the RI values were measured, all measurements were below 0.50. In addition, these vessels were found to have a low impedance. None of the patients with uterine artery RI greater than 0.80 were diagnosed to have endometrial pathology during their histopathologic examination. Among 21 patients, most of them had uterine artery RI's under 0.80 and were diagnosed to have endometrial pathologies ($p < 0.0005$).

All of the 6 patients with endometrial carcinoma had endometrial thickness above 10 millimeters. In 8 of the 15 patients with endometrial hyperplasia, the thickness of the endometrium was less than 10 mm, and in the remaining 4 less than 5 mm. The fact that endometrial thickness is above 5 millimeters does not rule out endometrial atrophy.

The evaluation of the RI of the uterine artery shows a high sensitivity in the diagnosis of pathologic endometrial changes. We calculated the average RI value to be 0.70 in cases of endometrial hyperplasia and endometrial carcinoma.

The specificity of RI rises to a higher percentage when the group of patients with uterine fibroids is excluded. It is well known that in uterine fibroids, blood flow resistance is usually at lower levels. In this study one of the most obvious findings was that in women with

uterine fibroids there was not a very clear decrease in RI values of the uterine arteries.

As has been concluded in previous studies (1, 13, 14) as well as in ours it is possible to document blood vessels by using color Doppler ultrasonography in uterine fibroids.

Weiner et al (1) and Merce et al (12) noted that the uterine artery Doppler ultrasonography results correlated positively with histopathological studies in perimenopausal women. Our study revealed similar results.

Blood flow in vessels of uterine fibroids has a greater impedance when compared with the low impedance in malignant tumours. This is the most important point in differentiating between the two.

When screening for endometrial carcinoma, it is more convenient to reach a diagnosis of endometrial carcinoma if color Doppler ultrasonography is used and periendometrial blood vessel formation is noted. Also when a high resistance volume is obtained from the uterine artery, it may be possible to exclude invasive methods in women with perimenopausal bleeding. We believe that transvaginal color Doppler ultrasonography is beneficial in the diagnosis of endometrial tumours.

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