Transvaginal Echographic Diagnosis of Chronic Cervicitis

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Abstract
Objective: To study the echographic semiotics of cervicitis in women of reproductive age in a transvaginal way.

Materials and methods: The study included 166 women aged 19-35 years with chronic cervicitis. The diagnosis was established on the basis of clínico-laboratory, colposcopic and cytological studies. In 71 (42.8%) cases, the age of women varied between 19-25, in 95 (57.2%) - 26-35 years. The diagnosis was established on the basis of clinico-laboratory, colposcopic and cytological studies. The comparative group (CG) consisted of 50 healthy women who had a childbirth and abortion in anamnesis, with normal vaginal microbiocenosis and without pathological changes in the cervix. In 18 (36%) cases their age varied within the limits of 19-25, in 32 (64%) - 26-35 years respectively.

Results: The increased echogenicity of endocervix was not observed in 4-6 days of the cycle in healthy women and in 94 (56.6 ± 3.8%) cases of chronic cervicitis were observed. The heterogeneity of the endocervical echostructure in healthy women was recorded in 2 (4.0 ± 2.8%), and in cases of healthy women in 153 (92.2 ± 2.1%) cases, respectively (p <0.001). Hyperechoic inclusions in endocervix were observed in 112 cases (67.5 ± 3.6%) of chronic cervicitis, and in 4 (8.0 ± 3.8%) cases of healthy women (p <0.001). Cysts of endocervix in healthy women were noted in 67 (40.4 ± 3.8%) cases, and in healthy women - in 3 (6.0 ± 3.4%) cases, respectively (p <0.001). Among women with chronic cervicitis, small cystic cavities in the outer throat area were detected in 92 (55.4 ± 3.9%) cases, colposcopically in 71 (42.8 ± 3.8%) in cases (p <0.05).

Conclusions: In the early proliferative phase of the cycle, a combination of structural heterogeneity, increased echogenicity, the presence of an irregular shape of small cystic cavities and hyperechoic inclusions, moderate or increased vascularization are reliable signs of chronic endocervicitis. Chronic cervicitis in the majority of cases is accompanied with pseudo-erosion. Transvaginal echographically, pseudo-erosion is diagnosed better than erosion. In the diagnosis of erosion, transvaginal echography is inferior to colposcopy, but better reveals deep-seated changes. Transvaginal echography can better characterize the changes within the endocervix, which is not available endoscopy.

Keywords: Transvaginal Echography, Chronic Cervicitis

Introduction
Infectious and inflammatory diseases of the lower genitalia in women of reproductive age continue to occupy one of the leading places in the overall structure of gynecological morbidity, their frequency varies between 65-80% and does not tend to decrease. Various surgical interventions, traumas, abortions, early sexual debut contribute to a change in the microbiocenosis of the vaginal biotope, the selection of multiresistant strains of pathogenic and opportunistic microorganisms, the development of vulvovaginitis, exo- and endocervicitis. Endocervicitis can be caused by nonspecific specific pathogens and is more common in women of reproductive age. Inflammatory reaction in endocervix depends on the nature of the pathogen and the reactivity of the organism. Endocervicitis not diagnosed and untreated acute phase becomes chronic. Endoscopic methods do not allow visualizing the middle layers of endocervix and cervical stroma, and therefore the diagnosis of cervicitis is based on indirect data [1, 2].

Diagnosis of cervicitis was based: anamnesis collection; gynecological examination with the help of mirrors; colposcopy; laboratory tests. Laboratory tests included, bacteriological culture of the material to determine the type of pathogen; smear on cytology, which allows to determine the presence of cancer changes at the cellular level; microscopy of excreta for the study of bacterial flora, which are taken from three places (urethra, cervical canal and vagina).
Colposcopy allows you to visualize the vaginal part of the cervix, to identify suspicious for neoplasia changes in the transition zone. Cervicography makes it possible to visualize the mucous membrane of the cervical canal, visually assess its condition and determine the exact location of the lesion and its size. If a pathological focus is detected during the procedure, a targeted biopsy is performed for further histology. These methods in most cases provide detection of dysplasia, erosion and pseuderosion, inflammation of endocervix, cervical cancer localized in the transition zone [3-5]. It is known that cervicitis is often accompanied by the presence of erosions or pseuderosions of the cervix. Their presence creates favorable conditions for pathogenic flora and can contribute to the development of neoplastic processes [6, 7].

Careful manipulation of a transvaginal probe during gynecological ultrasound imaging allows the operator to assess the mobility and elasticity of pelvic structures, and analysis of these ‘dynamic images’ in the context of a patient’s symptoms can lead to a more reliable diagnosis than is possible using still ultrasound images or static ultrasonography alone [8].

The possibilities of transvaginal echography in the diagnosis of endometrial diseases, in particular chronic endometritis, have been studied quite extensively [9]. Among diseases of the cervix, the method is more used for the diagnosis of polyps, endometrioid cysts and myomas [10].

Recent research in this field, carried out with the help of high-frequency digital transvaginal echography, significantly helped to revise the possibilities of ultrasound diagnosis of the cervix [11, 12]. A few studies have been devoted to ultrasound examination of the external throat of the cervix [13]. The presence and nature of changes in cervix in chronic cervicitis is of interest.

Objective
Assess the nature of changes in the cervix in a chronic inflammatory process using transvaginal echography.

Materials and Methods
The study included 166 women with chronic cervicitis. In 71 (42.8%) cases, the age of women varied between 19-25 in 95 (57.2%) - 26-35 years. The diagnosis was established on the basis of clinico-laboratory, colposcopic and cytological studies. The comparative group (CG) consisted of 50 healthy women who had a childbirth and abortion in an anamnesis, with normal vaginal microbiocenosis and without pathological changes in the cervix. In 18 (36%) cases their age varied between 19-25, in 94 (56.6%) cases of ChC were observed.

In transvaginal ultrasound, the cervix of the uterus was visualized in longitudinal and transverse projection. The study was carried out in the early proliferative phase of the menstrual cycle. In the middle third of the cervix, the echo structure and total thickness of the endocervical leaflets (Te) were determined on the 4-6th days of the cycle. In addition, the echostructure of the external throat of the cervix was assessed. The total thickness of the endocervical leaf (Te) and the thickness of the cervix (Tc), their ratio (Te / Tc) was calculated. Such echographic parameters as echogenicity, heterogeneity, sharpness of contours, presence of echopositive inclusions and endocervical cysts, character expansion of the cervical canal (CC), the degree of vascularization of endocervix.

Results
As can be seen from the table, there were no significant differences in the thickness of the endocervix and the cervix between the data of women with chronic cervicitis (ChC) and CG, and the Te / Tc index differed with minimal reliability (p <0.05).

Reduced echogenicity of endocervix in female CG was noted in 18 (36.0 ± 6.8%), and in ChC - in 23 (13.9 ± 2.7%) cases (p <0.05), average echogenicity - in 9 (18.0 ± 5.4%) and 21 (12.6 ± 2.6%) cases, isoechogetic - in 23 (46.0 ± 7.0%) and 28 (16.9 ± 2.9%) cases (p <0.001), respectively. The increased echogenicity of endocervix was not observed in these days of the cycle in CG, and in 94 (56.6 ± 3.8%) cases of ChC were observed.

Clear contours of endocervix in CG are noted in 14 (28.0 ± 6.3%), in cases of ChC - in 19 (11.4 ± 2.6%) cases, indistinct - in 36 (72.0 ± 6.3%) and 147 (86.6 ± 2.6%) cases (p <0.01), respectively. The heterogeneity of the endocervical echostructure in the CG was recorded in 2 (4.0 ± 2.8%), and in cases of ChC in 153 (92.2 ± 2.1%) cases, respectively (p <0.001).

Hyperechoic inclusions in endocervix were observed in 112 cases (67.5 ± 3.6%) of ChC, and in 4 (8.0 ± 3.8%) cases of CG (p <0.001). Cysts of endocervix in ChC were noted in 67 (40.4 ± 3.8%) cases, and in CG - in 3 (6.0 ± 3.4%) cases, respectively (p <0.001) (Fig. 1, 2).

Figure 1: Chronic endocervicitis - there are hyperechoic inclusions in the hypoechoic endocervix with a fuzzy contour.

Figure 2: Chronic endocervicitis - small cystic cavities in endocervix, blurred contours, increased thickness of the cervix, increased echogenicity and heterogeneous structure of endocervix.

In the early proliferative phase of the menstrual cycle, the dilatation of the cervical canal in the CG was not observed, and among patients with ChC in 19 (11.4 ± 2.6%) cases it was even, and in 98 (59.0 ± 3.8%) cases-uneven, respectively (Fig. 3).
Figure 3. Transvaginal longitudinal and transverse echogram of the cervix in chronic endocervicitis. In the middle third, the local uneven expansion of the cervical canal is determined, the contours of the endocervix are diffuse.

In color and energy Doppler modes, we studied the degree of vascularization of endocervix, which was assessed as reduced, moderate and increased. Reduced vascularization was registered in 43 (86.0 ± 4.9%) female of CG and on 36 (21.7 ± 3.2%) patients with ChC (p <0.001), moderate - in 7 (14.0 ± 4.9 %) and 101 (60.8 ± 3.8%) of women in the corresponding groups, respectively (p <0.001). Increased vascularization of endocervix was observed in 29 (17.5 ± 2.9%) women with chronic cervicitis.

Table 1: Echographic indicators of endocervix on days 4-6 of the cycle

| Echographic parameters                  | Chronic cervicities (n=166) | CG (n=50) | P      |
|----------------------------------------|-----------------------------|-----------|--------|
| The total thickness of the endocervical leaflets, Te, mm | 5,4±0,7                  | 5,7±0,6   | –      |
| The thickness of the cervix, Tc, mm    | 31,3±2,8                   | 26,1±1,8  | –      |
| Tc/TuM                                 | 0,17±0,01                 | 0,22±0,017| <0,05  |
| Reduced echogenicity of endocervix     | 23 (13, 9±2, 7%)          | 18 (36, 0±6, 8%) | <0,05  |
| Moderate echogenicity of endocervix    | 21 (12, 6±2, 6%)          | 9 (18, 0±5, 4%) | <0,05  |
| Increased echogenicity of endocervix   | 94 (56, 6±3, 8%)          | –         | <0,001 |
| Isoechoic endocervix                   | 28 (16, 9±2, 9%)          | 23 (46, 0±7, 0%) | <0,001 |
| Clear contours of endocervix          | 19 (11,4±2,6%)            | 14 (28, 0±6, 3%) | <0,05  |
| Fuzzy contours of endocervix          | 147 (88,6±2,6%)           | 36 (72, 0±6, 3%) |        |
| Heterogeneity                          | 153 (92, 2±2, 1%)         | 2 (4, 0±2, 8%) | <0,001 |
| Hyperechoic inclusions in endocervix  | 112 (67, 5±3, 6%)         | 4 (8, 0±3, 8%) | <0,001 |
| Endocervical cysts                     | 67 (40, 4±3, 8%)          | 3 (6, 0±3, 4%) | <0,001 |
| Even cervical canal dilatation         | 19 (11, 4±2, 6%)          | –         |        |
| Uneven cervical canal widening         | 98 (59, 0±3, 8%)          | –         |        |
| Vascularization of the endocervix      |                            |           |        |
| minimal                                 | 36 (21, 7±3, 2%)          | 43 (86, 0±4, 9%) | <0,001 |
| moderate                                | 101 (60, 8±3, 8%)         | 7 (14, 0±4, 9%) | <0,001 |
| increased                               | 29 (17, 5±2, 9%)          | –         | <0,001 |

A comparative analysis of the results of colposcopic and transvaginal ultrasonographic examination of the external uterine cavity is performed.

In 34 (68.0 ± 6.6%) female of CG with TV echography of the external throat, small cysts (ovula Nabothi) less than 4 mm in size were noted. In colposcopy, they were detected in 51 (30.7 ± 3.6%) women (p <0.001). Among women with chronic cervicitis, small cystic cavities in the outer throat area were detected in 92 (55.4 ± 3.9%) cases, colposcopically in 71 (42.8 ± 3.8%) in cases (p <0.05) (Fig. 4, 5).

Figure 4: The colposcopic view of the cervicitis.

Figure 5: Transvaginal echographic view of the chronic cervicitis.

In 14 (8.4 ± 2.1%) cases of ChC with colposcopy erosions were revealed, in 143 (86.1 ± 2.7%) - pseudo-erosion. In 3 (21.4%) women with erosion echographically in the area of external throat changes were not detected. In 4 (28, 6%) cases in the region of the anterior or posterior lip, inclusions with a depth of up to 2 mm, fluid inclusions less than 3 mm in width, a depth of 1.5 mm, cysts up to 4 mm in size were detected. In the remaining 7 (50.0%) of 14 women with erosion, the inclusions were deep, fluid inclusions broad (more than 3 mm).

Echographically, there were no changes in 12 (8.4%) women with pseudo-erosion in the external throat area, 27 (18.9%) had small sliced and fluid inclusions, the remaining 104 (72.7%) patients had large fluid inclusions, cysts 4-8 mm in size (Fig. 6, 7).

Figure 6: The colposcopic view of the pseudo-erosion.
When comparing the echographic parameters of patients with erosion and pseudo-erosions, as well as a comparative group with colposcopy data, it is established that the echography of the cystic cavity of both healthy women and women with chronic cervicitis reveals more often than endoscopy. In addition, with chronic cervicitis pseudo-erosion is detected by high frequency, in the diagnosis of which, the main role is played by colposcopy. With erosion in only half the cases, transvaginal echography reveals changes in the area of the external throat, and in pseudo-erosion - in 91.6% (18.9% + 72.7%) of cases.

Conclusions
1. In the early proliferative phase of the cycle, a combination of structural heterogeneity, increased echogenicity, the presence of an irregular shape of small cystic cavities and hyperechoic inclusions, moderate or increased vascularization are reliable signs of chronic endocervicitis.
2. Chronic cervicitis in the majority of cases is accompanied with pseudo-erosion. Transvaginal echographically, pseudo-erosion is diagnosed better than erosion.
3. In the diagnosis of erosion, transvaginal echography is inferior to colposcopy, but better reveals deep-seated changes.
4. Transvaginal echography can better characterize the changes within the endocervix, which is not available endoscopy.

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