Endometrial hyperplastic processes in perimenopausal women. Clinical and anamnestic analysis by using neural network clustering

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Abstract

Hyperplastic processes of endometrium represent an extremely important, complex and multi-faceted problem of practical gynecology, because it takes from 10 to 50% in the gynecological pathology structure, and its incidence is increasing steadily. At the same time they have tendency to a prolonged, recurrent course, and the absence of specific, pathognomonic symptoms, the complexity of differential diagnosis. Therefore, the effective diagnosis of these diseases and prevention of complications is particularly important. The use of the information technology in medicine, and especially in order to improve the diagnosis of gynecological diseases, has become increasingly important.

The purpose of our study is to improve efficacy of the diagnostic of endometrial hyperplastic processes in perimenopausal women, based on in-depth analysis of clinical and epidemiological data in different types of hyperplasia using neural network clustering.

Methods. There have been performed a retrospective analysis of 52 medical cards and biopsies of perimenopausal women: 1st group -28 women with simple endometrial hyperplasia (SEH); 2nd group – 24 women with complex endometrial hyperplasia (CEH), the control group consisted of 12 healthy women aged (45,5 ± 0,7)years. We analyzed patients' age, socio-economic factors, obstetrical and gynecological history, clinical and laboratory

features of the course of climacteric syndrome and comorbid conditions for women with different types of hyperplasia. Histopathological diagnosis was verified histologically and clinically.

Results

Risk factors for hyperplastic processes of the endometrium for women in perimenopausal period include unfavorable socio-economic factors: living in rural areas, difficult working conditions, and bad habits. Endometrial hyperplasia was significantly more likely to develop for women with chronic diseases of the uterus, three or more pregnancies, a large number (4 or more) obstetrical and gynecological interventions and using intrauterine contraceptive. For women with different types of endometrial hyperplastic processes climacteric syndrome had moderate or severe course with anemia, vegetative, psycho- and endocrine-metabolic disorders. Among the comorbid conditions of women in perimenopausal period with endometrial hyperplasia more often observed the dishormonal pathology and the breast disorders of hepato-biliary tract. The results, based on analysis of combined changes with using multiparameter neural clustering have shown that the relatively older age and menopausal syndrome revealed a relatively higher proportion of carried surgical interventions of patients and based on these results, we can predict the progression of endometrial hyperplastic processes. The results have identified patterns based on clinical and anamnestic analysis using multiparameter neural clustering could be used to develop diagnostic criteria for predicting disease development in the region.

Conclusion The results have identified patterns based on clinical and anamnestic analysis using multiparameter neural clustering could be used to develop diagnostic criteria for predicting disease development in the region.

Key words: Hyperplastic processes, endometrial hyperplasia, endometrial hyperplastic processes, perimenopausal, neural network clustering.

Introduction

In recent years there is an increase of the incidence of hyperplastic processes of the reproductive system in which endometrial hyperplasia occupy a special role. Endometrial hyperplasia remains one of the most important problems of modern gynecology, because it takes from 10 to 50% in the gynecological pathology structure, and its incidence is increasing steadily [4, 5, 10, 11].

Relevance of pathology is determined by significant incidence, long-term recurrent course, and possibility of malignancy, medical and social importance of preserving the quality

of life of patients. Therefore, the effective diagnosis of these diseases and forecasting of complications is particularly important.

The use of the information technology in medicine, and especially in order to improve the diagnosis of gynecological diseases, has become increasingly important [11, 13]. Thus, the costs of health care's computerization of in European countries occupy up to 5% of the budget [5, 6, 10, 12]. However, the problem of daily use of information techniques is not completely solved even if they are easy in technique and does not require significant financial costs.

Purpose. We aimed to improve efficacy of the diagnostic of endometrial hyperplastic processes in perimenopausal women, based on in-depth analysis of clinical and epidemiological data in different types of hyperplasia using neural network clustering.

Methods. There have been performed a retrospective analysis of 52 medical cards and biopsies, that have been taken of perimenopausal women in the gynecological departments of medical institutions of Ternopil region. According to the histopathological findings all patients were divided into two groups. 1st group included 28 women with simple endometrial hyperplasia (SEH); 2nd group – 24 women with complex endometrial hyperplasia (CEH). The control group consisted of 12 healthy women aged $(45,5 \pm 0,7)$ years.

There have been analyzed: patients' age, socio-economic factors, obstetrical and gynecological history, clinical and laboratory features of the course of climacteric syndrome and comorbid conditions for women with different types of hyperplasia.

Histopathological diagnosis was verified histologically and clinically using WHO classification of endometrial hyperplastic processes of in 1994 [4]. The control group consisted of 12 healthy women aged $(45,5 \pm 0,7)$ years.

Mathematical analysis have been carried out by the methods of analysis of variations using standard application package Microsoft Excel. We have determined the following parameters: arithmetic mean (M), standard deviation (δ), standart error of the mean (m). Statistical significance between the arithmetic mean and relative values was estimated by Student -Fisher's criterion (t) [7, 8, 9,14].

Results and discussion

We have conducted a retrospective analysis of patient's cards of 52 women. According to the histopathological findings all patients were divided into two groups. 1st group included 28 women with simple endometrial hyperplasia (SEH); 2nd group – 24 women with complex endometrial hyperplasia (CEH).

The average age of patients of 1st group was – (47,0 ± 0,7) years, 2nd group – (56,0 ± 1,2) years.

The reason for admission to medical institutions in 22 ((78,6 ± 7,9) %) women of 1st group and in 21 ((87,5 ± 6,9)%) women of 2nd group was the presence of complaints, while 20 % of simple endometrial hyperplasia and 12 % complex endometrial hyperplasia have been observed during routine inspection. This tendency indicates a low level of appeals to the medical institutions, lack of timely prevention and clinical examination of women with identified risk factors for the disease.

Duration of the disease after established diagnosis averaged (4,09 ± 0,4) years for women of 1st group and (3,68 ± 0,5) years of patients of 2nd group.

The analysis of the causes of the disease revealed a significant effect of unfavorable socio-economic conditions. Among examined patients 2/3 of women are living in rural areas. In addition, 18% of women with SEH and almost 21 % of CEH noted the difficult or hazardous working conditions. An important role in the spreading of the disease is the presence of bad habits (smoking, alcohol), observed in nearly 11 % and 17 % of patients 1 and group 2, respectively (Table 1).

Table 1

Social and economic impact factors on women with hyperplastic processes, M ± m

Criteria	Number of women (%)		
	SEH (n=28)	CEH (n=24)	Control (n=12)
Place of residence	71,4±8,7	70,8±9,5	67,7±14,2
Difficult working conditions	17,9±7,4	20,8±8,5	8,3±8,3
Bad habits	10,7±6,0	16,7±7,8	8,3±8,3

Analysis of the gynecological history in perimenopausal period have determined that chronic uterine diseases observed significantly more frequently in women with complex endometrial hyperplasia than women with simple hyperplasia (P < 0.05) or without hyperplasia (P < 0.001). The other group differences in the incidence of gynecological diseases have not been identified. The structure of gynecological diseases of patients of 1st and 2nd groups is shown in Table 2.

Table 2

Gynecological history of women with endometrial hyperplasia, M±m

Diseases	Number of woman (%)		
	SEH (n=28)	CEH (n=24)	Control (n=12)
Vulvovaginitis	28,6±8,7	29,2±9,5	8,3±8,3
Chronic salpingoophoritis	42,9±9,5	54,2±10,4	8,3±8,3
Chronic diseases of uterine	32,1±9,0	66,7±9,9 $P_{1-1} < 0,05$	0 $P_{1-3} < 0,001$ $P_{2-3} < 0,001$
The cervix pathology	39,3±9,4	50,0±10,4	8,3±8,3

Our analysis of reproductive history found that in about half of women, the number of pregnancies exceeded three, which is 2.5 times more than in the control group. In addition, the amount of carried over obstetrical intervention and the use of intrauterine contraceptive rate was significantly ($P < 0.05$) higher for women with SEH and CSH than women without hyperplasia. Infertility was found in 2 (($7,14 ± 5,0$) %) women of 1st group and 1 (($4,17 ± 4,17$) %) woman in 2nd group (Table 3).

Table. 3

The reproductive history of women with endometrial hyperplasia, M±m

Criteria	Number of woman (%)		
	SEH (n=28)	CEH (n=24)	Control (n=12)
Number of pregnancies, ≤3	42,9±9,5	45,8±10,4	16,7±11,2
Number of obstetrical interventions, ≤4	60,7±9,4	62,5±10,1	25,0±13,1 $P_{1-3} < 0,05$ $P_{2-3} < 0,05$
Intrauterine contraception	21,4±7,9	37,5±10,1	8,3±8,3 $P_{2-3} < 0,05$
Infertility	7,14±5,0	4,17±4,17	0

The study of the clinical course of perimenopausal period have shown that moderate and severe degree of climacteric syndrome was marked significantly more often in women with SEH (P < 0.001, P < 0.01) and CEH (P < 0.05, P < 0.01), while in comparison group significantly more often (P < 0.001) were observed mild forms.

Within a retrospective analysis of patients we have found the following clinical signs of menopausal syndrome: dysfunctional uterine bleeding (100 %), urogenital disorders (30 %), irritability (90 %), fatigue (80 %), depression (70 %), headache (65 %), flushing (70 %), weight gain (29 %). Significant difference of clinical signs, depending on the type of hyperplasia or age of patients were found (Table 4).

Table 4

Clinical manifestations of climacteric syndrome in women with endometrial hyperplasia, M±m

Clinical signs	Number of woman (%)		
	SEH (n=28)	CEH (n=24)	Control (n=12)
Dysfunctional uterine bleeding	100	100	100
Urogenital abuse	21,4±7,9	33,3±9,8	8,3±8,3
Irritability	89,3±5,9	91,7±5,8	58,3±14,9
Fatigue	75,0±8,3	83,3±7,8	50,0±15,1
Depression	64,3±9,2	75,0±9,0	66,7±14,2
Headache	60,7±9,4	70,8±9,5	41,7±14,9
Flushing	67,9±8,9	75,0±9,0	41,7±14,9
Weight gain	28,6±8,7	29,2±9,5	16,7±11,2

The results of clinical blood test for women with endometrial hyperplasia indicated the presence of anemia that manifested a decrease in hemoglobin and red blood cells as the number of patients with PGE (P < 0.05) and for patients with BSE (P < 0.01) relative data comparison group. Also for women of 1st and 2nd group was noted a significant increase in erythrocyte sedimentation rate, unlike women without endometrial hyperplasia. Group differences were detected by blood parameters (table 5).

Table 5

Clinical blood test data for women with endometrial hyperplasia, M±m

Data	Average, M±m		
	SEH (n=28)	CEH (n=24)	Control (n=12)
Hemoglobin, g/l	104,14±3,4	101,83±4,5	112,5±3,3 P $_{2-3}$ < 0,05
Red blood cells, x10^{12}	3,27±0,1	3,17±0,1	3,6±0,1 P$_{1-3}$ < 0,05 P $_{2-3}$ < 0,01
White blood cells, x10^9	6,71±0,3	7,52±0,2	6,8±0,5
ESR, mm/h	14,53±1,0	16,37±1,3	11,2±0,9 P$_{1-3}$ < 0,05 P $_{2-3}$ < 0,01

During the comparing of the severity of anemia, depending on the type of hyperplasia, there were found that the women with simple endometrial hyperplasia were observed mild anemia severity (at $(32,1 \pm 9,0)$ % of patients), whereas the patients with endometrial hyperplasia of complex had moderate anemia (at $(37,5 \pm 10,4)$ % women).

We have observed that in almost 1/3 of women with different types of endometrial hyperplasia were dishormonal pathology of breast and hepatobiliary tract disease. For 20 % of the patients were found the disorders of the cardiovascular system. Among diseases of the endocrine system and metabolism was accounted a significant proportion of obesity and diabetes (for 18 % of women with SHE and 17 % – with CEH). Gastrointestinal pathology was detected in 3 $(14,3 \pm 6,7)$ %) women of 1st group and 5 $(20,8 \pm 8,5)$ %) of 2nd group. Urinary system diseases were observed in 25 % of women with SEH and 14 % – with CEH (Table 6).

To establish the value of combined changes of various parameters for the prediction of the disease progression was performed neuronet clustering, based on the anamnesis of patients with SEH and CGE: patients' age, time of hospitalization and disease duration, location, conditions, availability of bad habits, gynecological diseases, reproductive history, comorbid conditions, clinical course and severity of menopausal syndrome I – easy, II – medium, III – heavy, Irr – irritability, Ur – urogenital violations, Fat – fatigue, Dep –

depression, GM – dishormonal pathology of breast, End – diseases of the endocrine system and metabolism substances, Hep – hepatobiliary disease. Three clusters have been selected. Fig. 1 and Fig. 2 present some results of the program for patients with endometrial hyperplasia.

Table 6

Extragenital pathology for women with endometrial hyperplasia, M±m

Pathology	Number of woman (%)		
	SEH (n=28)	CEH (n=24)	Control (n=12)
Disgormonal breast pathology	32,1±8,9	33,3±9,8	8,3±8,3
Diseases of the cardiovascular system	21,4±7,9	20,8±8,5	16,7±11,2
Diseases of the endocrine system and metabolism	17,9±7,4	16,7±7,8	8,3±8,3
Pathology of the gastrointestinal tract	14,3±6,7	20,8±8,5	25,0±13,1
Urinary system diseases	14,3±6,7	25,0±9,0	8,3±8,3
Diseases of hepato-biliary tract	28,6±8,7	29,2±9,5	25,0±13,1

Indicator of the form of the disease ("F") was recorded as "1" in the SEH and "2" in the case of CEH in front of each patient. The largest relative proportion of patients with SEH, that means the progression of the disease, was detected in the second cluster (83.3 %). Meanwhile, the second cluster was 63.6 %, and 3rd – only 5.5 %. Using cluster portrait (Fig. 3) can be determined that the second cluster, along with the highest value of F, accounted the higher age (Age), surgical interventions (Oper), and moderate degree (II) of climacteric syndrome. In the mentioned cluster there was observed the higher indicator of erythrocyte sedimentation rate (ESR). However, hemoglobin (Hb), by contrast, was revealed even higher in the second cluster, which may indicate a negligible value using for forecasting combined factors of anemia's severity. Thus weighting coefficients of other indicators in the second cluster located at 1-2 clusters.

In conclusion, the comparative analysis of the average values and average relative indicators is the primary tool that makes it impossible to set a combination of changes in certain parameters for predicting disease progression. However, the cluster analysis portraits found that the combination of relatively older with an average degree of climacteric syndrome and a greater share of carried surgery, gives reason to predict the greatest risk of CEH in the

examined patients. Thus the design prediction algorithm, should take into account (as part of the combined changes) change in the index ESR.
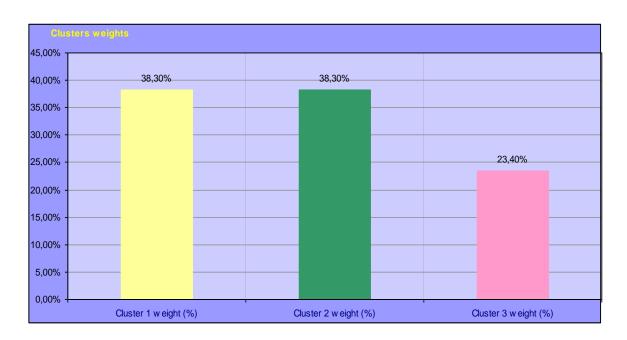

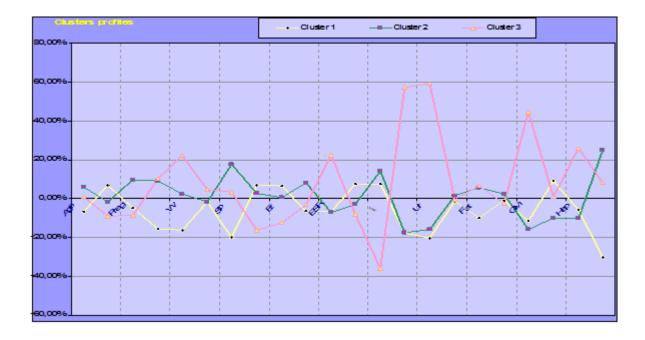Fig. 1. Shares of clusters - percentage of patients who were in a cluster.

Fig. 2. Cluster portrait - average values within a distributed of clusters

Conclusions

1.   Risk factors for hyperplastic processes of the endometrium for women in perimenopausal period include unfavorable socio-economic factors: living in rural areas, difficult working conditions, bad habits.

2.   Endometrial hyperplasia was significantly more likely to develop for women with chronic diseases of the uterus, three or more pregnancies, a large number (4 or more) obstetrical and gynecological interventions and using intrauterine contraceptive.

3.   For women with different types of endometrial hyperplastic processes climacteric syndrome had moderate or severe course with anemia, vegetative, psycho and endocrine-metabolic disorders.

4.   Among the comorbid conditions of women in perimenopausal period with endometrial hyperplasia more often observed the dishormonal pathology and the breast disorders of hepato-biliary tract.

5.   The results, based on analysis of combined changes with using multiparameter neural clustering have shown that the relatively older age and menopausal syndrome revealed a relatively higher proportion of carried surgical interventions of patients and based on these results, we can predict the progression of endometrial hyperplastic processes.

6.   The results have identified patterns based on clinical and anamnestic analysis using multiparameter neural clustering could be used to develop diagnostic criteria for predicting disease development in the region.

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