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INFLUENCE OF ALCOHOL ABUSE AND / OR HIV INFECTION ON MORPHO-FUNCTIONAL CONDITION OF THE UTERINE TUBE IN WOMEN OF REPRODUCTIVE AGE

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The fallopian tubes are a key link in the relationship between the uterus and the ovary. The aim of our study was to determine the effect of alcohol abuse and / or HIV infection on the morpho-functional state of the fallopian tubes in women of reproductive age.

Material and methods. *The study included sectional material, which was selected from 100 women of reproductive age (20 to 40 years), who were divided into four groups. The first group included section material from 25 women who had been laboratory confirmed for HIV. The second group included sectional material selected from 25 women suffering from chronic alcoholism. The third group consisted of sectional material from HIV-positive women who also showed signs of alcohol abuse. The fourth group includes sectional material selected from HIV-negative women.*

Results. *Gross pathological changes in the structure of the fallopian tube, due to both the impact of HIV infection and alcohol abuse was identified in each of the groups. Changes in morphometric parameters (length of the ampullary part, outer diameter of the tube at the junction of the isthmus in the ampullary part, the area of the lumen of the ampullary part) can cause severe complications of inflammation or lead to ectopic pregnancy. The study of the epithelial and muscular layer revealed destructive-sclerotic changes, which consist in reducing the height of the epithelium and increasing the proportion of connective tissue in the muscular layer of the tube.*

Conclusions. *According to the study, HIV and alcohol abuse are diseases that affect all elements of the fallopian tube. Thus, HIV infection and chronic alcohol abuse can exacerbate each other's negative effects on the female reproductive system and cause morphometric changes that can form a substrate for the development of inflammatory processes and lead to ectopic pregnancy*

Keywords: *HIV, alcohol abuse, morphometry, fallopian tube*

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1. Introduction

The fallopian tubes are the main link that plays a key role in the relationship between the uterus and the ovary [1] and play an important functional and morphological role in ensuring the physiological functioning of the female reproductive system [2].

The number of diseases of the female reproductive system is constantly growing, and often these pathological conditions are dangerous due to the development of complications [3], the spread of the inflammatory process to adjacent organs and tissues (with possible occurrence of pelvioperitonitis) [4]. The severity of symptoms of diseases of the reproductive system in general and the fallopian tube depends on many factors, one of which is comorbidities. Of particular interest are the changes that occur in the reproductive system under the influence of HIV [5]. This is due to the increasing rate of HIV spread, the length of asymptomatic or paucisymptomatic periods in the course of the disease, difficulties in diagnosis and untimely treatment of HIV. All this could lead to pronounced and irreversible changes in the struc-

ture of the fallopian tube [6]. It should also be noted that quite rarely we observe the presence of only HIV infection, without concomitant pathological conditions. HIV-infected people are most often patients with comorbidities and require a special individual approach to treatment and diagnosis. A characteristic feature of such people is an antisocial lifestyle [7], a tendency to bad habits. Therefore, often pathological changes in the body due to existing HIV infection are exacerbated by changes due to the lifestyle of this cohort of patients – smoking or excessive alcohol consumption [8]. For a differentiated approach to treatment, the contribution of each disease to the development of certain symptoms should be noted.

Given all the above, **the aim of the study** was to determine the impact of alcohol abuse and / or HIV infection on the morpho-functional state of the fallopian tubes in women of reproductive age.

2. Materials and methods

The study included section material of the pathology department of the Odessa Regional Clinical Oncolo-

gy Hospital, Odessa Regional Pathology Bureau from 2013 to 2020, which was selected from 100 women of reproductive age (20 to 40 years), who were divided into four groups. The first group included section material from 25 women who had been laboratory confirmed for HIV. The second group included sectional material selected from 25 women suffering from chronic alcoholism. The main sign of chronic alcoholism was the presence of alcoholic cirrhosis of the liver. The third group consisted of sectional material from HIV-positive women who also showed signs of alcohol abuse. The fourth group (comparison group) included sectional material selected from HIV-negative women who did not have pathology of the reproductive system, had no signs of alcohol abuse, and died of causes not related to the reproductive system (accidents and etc.).

All studies were conducted in accordance with the Declaration of Helsinki, approved by the Ethics Commission of the Odessa National Medical University (Minutes 3, October 17, 2011).

The section material was fixed in 10 % buffered neutral formalin solution, followed by paraffin filling. Sections 5×10^{-6} m thick were made from the prepared blocks. The sections were stained with hematoxylin and eosin.

Microscopic examination was performed on an Olympus BX41 microscope (Olympus Corporation,

Japan) followed by morphometric examination using the Olympus DP-soft 3.12 program.

Particular attention in microscopic examination was paid to the morphometric parameters of the fallopian tube. The height of the epithelial layer and the relative volume of connective tissue in the muscular layer of the tube were determined to assess the severity of destructive sclerotic changes.

In addition, attention was paid to such morphometric parameters as the length of the ampullary department, the outer diameter at the junction of the isthmus in the ampullary department, the area of the lumen of the ampullary department.

Statistical processing was performed using Microsoft Excel 2010 using Attestat 12.0.5. Estimation of the probability of discrepancies between the compared indicators was performed using Student's t-test. All values were expressed as averages, taking into account the standard error of the mean. An acceptable level of reliable values was considered $p \leq 0.05$.

3. Results

In the course of the work, the morphometric parameters of the fallopian tube in all four groups of women were studied. The results of the study are presented in Table 1.

Table 1

Morphometric parameters of the fallopian tubes

Parameter	Comparison group, n=25	HIV-infected women, n=25	Chronic alcoholism, n=25	Chronic alcoholism and HIV, n=25
The length of the ampullary section, $\times 10^{-3}$ m	79.47 \pm 0.51	72.51 \pm 0.38*	73.47 \pm 0.52*	69.91 \pm 0.78*
The outer diameter at the junction of the isthmus in the ampullary department, $\times 10^{-3}$ m	6.81 \pm 0.23	5.77 \pm 0.31*	5.61 \pm 0.44*	5.66 \pm 0.38*
The area of the lumen of the ampullary department, $\times 10^{-6}$ m ²	9.44 \pm 0.44	8.13 \pm 0.34*	8.20 \pm 0.594*	7.66 \pm 0.55*
The relative volume of connective tissue in the muscle layer, %	5.61 \pm 1.01	21.33 \pm 2.82	22.88 \pm 2.12*	17.39 \pm 3.81
The height of the epithelial layer, $\times 10^{-6}$ m	92.01 \pm 4.03	67.30 \pm 3.83	71.39 \pm 3.13*	65.41 \pm 3.20

Note: * – the presence of a significant difference relative to the comparison group ($p < 0.05$)

As can be seen from Table 1, HIV infection and chronic alcoholism affect the morphometric parameters of the fallopian tubes. Thus, the most pronounced shortening of the ampullary part of the fallopian tubes was observed in HIV-infected women who abused alcohol. In this group of women this figure is $69.91 \pm 0.78 \times 10^{-3}$ m, while in the group of HIV-infected it is $72.51 \pm 0.38 \times 10^{-3}$ m, in women with chronic alcoholism – $73.47 \pm 0.52 \times 10^{-3}$ m, and in the control group – $79.47 \pm 0.51 \times 10^{-3}$ m.

Along with the reduction of the size of the ampullary department, the areas of reduction of its lumen were also determined. This indicator was also minimal in the group of HIV-infected women suffering from alcoholism, in them it was $7.66 \pm 0.55 \times 10^{-6}$ m², while in HIV infection it was $8.13 \pm 0.34 \times 10^{-6}$ m², with chronic alcoholism – 8.20 ± 0.594 , and in the control group was much larger and was $9.44 \pm 0.44 \times 10^{-6}$ m².

As could be seen from the study, both the length of the ampullary part of the fallopian tube and its lumen are minimal in the combination of HIV and chronic alcoholism in women. However, it should be noted that both indicators are slightly (1.32 % and 0.86 %, respectively) in the group of HIV-infected women compared to the group of women suffering from chronic alcoholism. This suggests that the presence of HIV infection has a greater negative impact on the condition of the ampullary department than alcohol abuse, but the combination of these factors can lead to severe changes in the structure of the ampullary part of the fallopian tube. This fact could be potentially dangerous, as such women are more likely to develop an ectopic pregnancy. Given the often antisocial lifestyle, it is possible to predict a rather late detection of these pathological conditions, which could lead to complications dangerous to the health and life of such patients (peritonitis, pelvioperitonitis) [9, 10].

The next indicator that was studied was the outer diameter at the junction of the isthmus in the ampullary department. This figure was minimal in the study of sectional material of patients suffering from chronic alcoholism. It was 0.89 % lower than this in the combination of HIV and alcoholism ($5.66 \pm 0.38 \times 10^{-3}$ m) and was $5.61 \pm 0.44 \times 10^{-3}$ m, in the group of HIV-infected people – $5.77 \pm 0.31 \times 10^{-3}$ m, and in the control – $6.81 \pm 0.23 \times 10^{-3}$ m. Thus, the obtained results allow us to assume that excessive alcohol abuse could lead to a significant reduction in the outer diameter of the uteruspipes compared to the control group. These changes are more pronounced than in the group of HIV-infected women, which may also play a significant role in ectopic pregnancy. In addition, it is known that excessive alcohol consumption, and especially HIV infection, leads to marked changes in a person's immune status. This may be the basis for the accession of secondary infection and the development of inflammatory processes in the fallopian tube. Given all the above changes, which are due to both HIV and chronic alcoholism, we could expect the development of a pronounced clinical picture of inflammatory processes in HIV-infected women who drink excessively, the development of hydrosalpinx and involvement in peritoneal inflammation with subsequent occurrence of pelvioperitonitis.

The next step was to examine the height of the epithelial layer and the relative volume of connective tissue in the muscular layer of the tube. It was determined that the minimum height of the epithelial layer is characteristic of the group of HIV-infected women suffering from chronic alcoholism. In them, this figure was $65.41 \pm 3.20 \times 10^{-6}$ m and was 9.14 % lower than in the group of women who drank too much and 2.89 % lower than in HIV-infected women. In these groups, the height of the epithelium was 71.39 ± 3.13 and $67.30 \pm 3.83 \times 10^{-6}$ m. Thus, the presence of HIV and chronic alcoholism could lead to a decrease in the height of the epithelium, which could impede the movement of the fertilized egg to the cavity uterus and become the basis for the development of ectopic pregnancy.

In a study of the relative volume of connective tissue in the muscle layer, it was determined that maximally this figure was in women with chronic alcoholism and was 22.88 ± 2.12 %. In HIV-infected – 21.33 ± 2.82 , and in the combination of HIV and alcoholism – 17.39 ± 3.81 %, which is significantly less than the control group (5.61 ± 1.01).

4. Discussion

Thus, alcohol abuse could cause severe sclerotic changes in the structure of the fallopian tube, which is manifested by a progressive increase in the mass fraction of connective tissue in the muscular layer of the fallopian tube of women suffering from chronic alcoholism. This figure was even higher than that of HIV-infected women.

It could be assumed that the severity of sclerotic changes may reduce the contractile capacity of the fallopian tube and may lead to ectopic pregnancy.

Thus, as could be seen from the study in each of the groups identified gross pathological changes in the structure of the fallopian tube, due to both the impact of HIV infection and alcohol abuse. Changes in morphometric parameters (length of the ampullary department, outer diameter of the tube at the junction of the isthmus in the ampullary department, the area of the lumen of the ampullary department) can cause severe complications of inflammation or lead to ectopic pregnancy. The study of the epithelial and muscular layer revealed destructive-sclerotic changes, which consist in reducing the height of the epithelium and increasing the proportion of connective tissue in the muscular layer of the tube [11, 12].

Our results are consistent with previously published data on the effects of immunodeficiency on tissue remodelling of the female reproductive system [13–15], and could be used in the development of automatic image processing programs [16].

Study limitations is its carrying out on sectional material that does not give the chance to observe revealing of features in changes of a structure of a uterine tube in dynamics.

Prospects for further research is to study the duration of alcohol dependence and its severity, the duration of HIV infection on the condition of the fallopian tube.

5. Conclusions

1. HIV infection and chronic alcoholism are diseases that affect the morphofunctional state of the fallopian tube with a predominance of atrophic changes, with changes in patients with HIV and chronic alcoholism accumulating, which reduces the length of the ampullary section to $69.91 \pm 0.78 \times 10^{-3}$ m, outer diameter at the junction of the isthmus in the ampullary department up to $5.66 \pm 0.38 \times 10^{-3}$ m, the area of the lumen of the ampullary department up to $7.66 \pm 0.55 \times 10^{-6}$ m².

2. The relative volume of connective tissue in the muscle layer increases to 17.39 ± 3.81 %, the height of the epithelial layer decreases to $65.41 \pm 3.20 \times 10^{-6}$ m.

3. HIV infection and chronic alcoholism can increase the negative impact of each other on the female body and cause morphometric changes, which could be a substrate for the development of inflammatory processes and lead to ectopic pregnancy.

Conflict of interests

The authors declare that they have no conflicts of interest.

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