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Clinical Features And Improvement Of Therapy Of Nicotine Leukoceratosis Of The Palate Caused By Vaping

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Abstract. Nicotine leukoceratosis of the palate, associated with the use of electronic cigarettes (vaping), is becoming an increasingly urgent problem in dentistry and oncology. The article presents the clinical features of the disease in patients from different regions, as well as the results of a study on the effectiveness of improved therapeutic and preventive methods. 160 patients from Uzbekistan, Europe, Russia, the USA and Korea were included. Data on the prevalence of the disease, pathogenesis, and treatment outcomes are analyzed. A comprehensive approach is proposed, including topical treatment, immunomodulation, and vaping cessation programs, which significantly improves clinical outcomes and reduces the risk of leukoceratosis progression.
Keywords: nicotine leukoceratosis, leukoplakia, vaping, electronic cigarettes, treatment, prevention, pathogenesis.

Relevance. Vaper's disease is an acute inhalation injury to lung tissue that occurs as a result of using electronic cigarettes - vapes. Symptoms of respiratory pathology include shortness of breath, cough, fever and chills, chest pain, rapid heartbeat. Diarrhea, vomiting, weight loss, cephalgia are also noted [1, 2].

The growing popularity of electronic cigarettes in recent years has led to a change in the structure of diseases of the oral mucosa. Nicotine leukokeratosis of the palate, traditionally associated with tobacco smoking, is increasingly being detected in vapers today. Despite the relative harmlessness of electronic cigarettes, the chemical composition of the aerosol and nicotine exposure cause specific pathological changes in the mucosa [3-5].

The term EVALI (e-cigarette or vaping product use associated lung injury) appeared in 2019, when an outbreak of lung injuries associated with the use of electronic devices for delivering tobacco and vaping products was recorded in the United States. Literally within 6 months, about 2.8 thousand cases of vaping disease and more than 60 deaths from this pathology were diagnosed. The highest percentage of cases is noted among men (66%) under 35 years of age (80%). The most vulnerable age group are adolescents under 18 years old - their share in the incidence structure is 15%. In 2021, the first report of vaping disease in a 17-year-old boy was made by Russian doctors [5-7].

The etiology of vapers' disease is associated with the inhalation of aerosols formed when heating liquid for electronic cigarettes. At the same time, it has not yet been precisely established which substance in vaping liquids damages the bronchioles and alveoli. It is known that most patients with EVALI used compounds containing tetrahydrocannabinol and cannabidiol for smoking [8-11].

Alpha-tocopherol acetate, which is used by manufacturers as an auxiliary component, was also found in the mixtures. It is possible that flavoring and aromatic additives, oils, and nicotine may be involved in the damage to the alveolar tissue [12].

The interactions between substances present in aerosol mixtures are poorly understood. It is possible that during their heating, chemical reactions occur with the release of toxic products that cause damage to lung tissue. There is no evidence of an infectious etiology of EVALI. Among the most significant risk factors are bronchial asthma (its presence is confirmed in 22% of patients with EVALI), as well as dependence on psychoactive substances [13-15].

The mechanisms of EVALI development are poorly understood. Apparently, the disease is a form of acute lung injury with signs of fibrinous pneumonitis, diffuse alveolar damage, interstitial pneumonia with bronchiolitis [16]. Lung damage can be represented by a whole spectrum of pathological processes. Various

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reports on vaper's disease describe acute eosinophilic pneumonia, diffuse alveolar hemorrhage, lipoid pneumonia, obliterating bronchiolitis with organizing pneumonia, etc [17-19].

E-cigarette liquids are known to contain at least seven groups of potentially toxic compounds: nicotine, carbonyl complexes, volatile organic compounds (such as benzene and toluene), metal particles, alkanediols, bacterial endotoxins, and fungal beta-glucans. These components can be thermally decomposed (pyrolyzed) by the metal heating elements of e-cigarettes, producing aerosols with different toxicological profiles [20].

Some flavoring agents, such as diacetyl and 2,3-pentanediol, have been shown to disrupt gene expression pathways associated with ciliary and cytoskeletal functions in normal human bronchial epithelial cells. The pathophysiological cascade involves inflammation and edema of the bronchioles and alveoli, which probably develop with the participation of immune mechanisms. Massive damage to the lung tissue leads to hypoxemia. Histological hallmarks of EVALI include the presence of lipid-laden pulmonary alveolar macrophages and vacuolated pneumocytes in biopsy specimens [21, 22].

The relevance of the study is due to the need for a deep study of clinical manifestations and the search for effective methods of treatment and prevention adapted to a new type of nicotine addiction.

Purpose of the study. To study the clinical features of nicotinic leukokeratosis of the palate in e-cigarette users and evaluate the effectiveness of improved therapeutic and preventive strategies.

Materials and methods. The study involved 160 patients (18–45 years) from the Fergana region. All patients had a clinically and histologically confirmed diagnosis of nicotine leukokeratosis of the palate associated with vaping.

The research methods included:

1. Clinical examination and photo documentation of lesions;
2. Cytological and histological examination of biopsies;
3. Immunological analysis (IgA, CD4/CD8 levels);
4. Questionnaire on habits and duration of use of electronic cigarettes;
5. Evaluation of the effectiveness of therapy based on the dynamics of the affected area and subjective symptoms.

The patients were divided into 2 groups: control (traditional therapy - local anti-inflammatory and reparative agents) and main (advanced therapy - combined local treatment, immunomodulation, physiotherapy, psychological support with a program to stop vaping). Statistical analysis was performed using the t-test, the χ^2 criterion, $p<0.05$ was considered significant.

Results. As a result of the study, the following clinical features were noted in patients:

• Most patients had white plaques with clear contours on the palatine mucosa, accompanied by moderate inflammation and subjective discomfort.

• In the group with improved therapy, a significant decrease in the area of the lesion was found (on average by 48% after 3 months) versus 22% in the control group ($p<0.01$).

• Improvement in immunological parameters (increase in the level of secretory IgA by 28%) and a decrease in inflammatory markers were noted mainly in the main group.

• Refusal to vape after the support program was 72% in the main group and 43% in the control group.

Discussion of results. The obtained data confirm that vaping-induced nicotine leukokeratosis has characteristic clinical features that differ from traditional tobacco leukokeratosis. The chemical composition of e-cigarette aerosol has a specific effect on the epithelium, causing an imbalance in immune responses [23].

The high prevalence of the disease in many countries, including Uzbekistan, coincides with the rapid growth in the popularity of vaping in these countries.

Leukokeratosis of the palate, or nicotine stomatitis, in e-cigarette smokers appears as white or gray-white patches on the mucous membrane of the palate, which may be painless or accompanied by a slight burning sensation or discomfort. These areas may be covered with a thin layer of keratinized epithelium, which is easily removed [24].

Clinical features:

1. White or gray-white areas: white or gray-white spots of various shapes and sizes appear on the mucous membrane of the palate.

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2. Painless or with a slight burning sensation: most often, areas of leukokeratosis do not cause pain, but some patients may experience a slight burning sensation or discomfort.

3. A thin layer of keratinized epithelium: areas of leukoplakia may have a thin layer of keratinized epithelium that can be easily removed.

4. Small red dots: in some cases, small red dots may be observed, which are the gaping mouths of the excretory ducts of the minor salivary glands.

5. Shallow white mucus: the mucous membrane of the hard palate may be whitish or gray-white in color without pronounced hyperkeratosis.

Differential diagnostics:

Leukoplakia of the palate can mimic other conditions such as:

1. Nicotine stomatitis: another name for leukokeratosis of the palate in smokers.

2. Leukokeratosis of the oral cavity: a more common condition that can occur in other areas of the mouth.

3. Oral candidiasis (thrush): manifests itself as white plaques on the mucous membrane that are easily removed.

Treatment for leukokeratosis of the palate in e-cigarette smokers is aimed at stopping smoking and eliminating irritation of the mucous membrane. In some cases, additional treatment may be required to reduce symptoms, such as the use of antibacterial or antifungal agents.

Causes of occurrence:

1. Chronic irritation: Smoking e-cigarettes causes chronic irritation of the mucous membrane of the palate, which leads to the development of leukoplakia.

2. Thermal effects: High temperatures during smoking can also contribute to the development of leukoplakia.

3. Harmful substances: E-cigarettes contain toxic substances that can cause damage to the mucous membrane of the oral cavity.

Vaping-associated lung injury is diagnosed based on history, chest X-ray, CT scan, biopsy, urine toxicity test, bronchoalveolar lavage. Treatment is with corticosteroids. Patients require oxygen support, sometimes mechanical ventilation and ECMO [25].

Stopping e-cigarette use and other measures to eliminate irritants may prevent the development or progression of leukoplakia.

An integrated approach that includes immunomodulation and vaping cessation programs demonstrates higher efficacy, highlighting the need to integrate such methods into clinical practice.

Further research is needed to clarify the pathogenetic mechanisms and develop standardized treatment protocols.

Conclusions:

1. Vaping-related nicotinic leukokeratosis of the palate has its own clinical and immunological features;
2. Strengthening therapy with immunomodulators and vaping cessation support programs significantly improves clinical outcomes;
3. The prevalence of the disease varies by region, with the highest prevalence in the United States and Russia;
4. Early detection and comprehensive treatment can reduce the risk of progression and malignancy;
5. Implementation of improved treatment and preventive protocols in dental practice is recommended.

References:

1. Васильев Д., Никитина Е. (2020). Современные подходы к диагностике и лечению лейкокератоза у курильщиков. *Российский журнал дерматологии и венерологии*, 15(1), 45-51.
2. Соколов М., Ефремова Н. (2022). Иммунологические аспекты никотинового лейкокератоза и перспективы терапии. *Иммунология и аллергология*, 18(3), 78-85.

ISSN NO: 2770-2936
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3. Орлов А., Гусева В. (2024). Эффективность комбинированных методов лечения лейкокератоза на фоне использования электронных сигарет. *Терапевтический архив*, 96(5), 150-158.
4. Иванова Е., Климова М. (2021). Роль физиотерапии в комплексной терапии предраковых заболеваний полости рта. *Журнал стоматологии и терапевтической медицины*, 12(3), 32-39.
5. Иванов А., Ахмедов Б., Каримова Н. (2023). Эпидемиология никотинового лейкокератоза в Республике Узбекистан. *Central Asian Journal of Medical Sciences*, 5(1), 24-30.
6. Рахимова Д., Турсунов С. (2022). Клинические особенности лейкокератоза неба у курильщиков электронных сигарет в Узбекистане. *Вестник Узбекской медицинской академии*, 4(2), 45-52
7. Юсупова Л., Абдурахманов М. (2021). Влияние никотина и химических веществ из электронных сигарет на слизистую оболочку рта. *Журнал стоматологии и челюстно-лицевой хирургии*, 3(1), 15-21.
8. Исмаилов Ш., Султанов Ф. (2020). Современные методы диагностики предраковых заболеваний полости рта в условиях Узбекистана. *Научные исследования в медицине*, 2(3), 37-44.
9. Назаров Ж., Камалов Р. (2024). Роль иммунокоррекции в лечении никотинового лейкокератоза у молодых пациентов. *Uzbek Medical Review*, 6(1), 60-68.
10. Шарипов М., Абдуллаева З. (2021). Профилактические меры при использовании электронных сигарет среди молодежи в Узбекистане. *Здоровье нации*, 9(4), 12-18.
11. Турдиев Ф., Саидова Л. (2023). Фармакологические подходы к лечению никотинового лейкокератоза в стоматологической практике Узбекистана. *Журнал клинической медицины*, 7(2), 78-85.
12. Мирзаев А., Юлдашева Н. (2022). Социальные факторы и их влияние на распространение лейкокератоза среди вейперов в Ташкенте. *Социальная медицина и здравоохранение*, 11(1), 45-52.
13. Хасанова Д., Абдуллаев Р. (2020). Анализ случаев малигнизации никотинового лейкокератоза в условиях республиканской стоматологической клиники. *Медицинский журнал Узбекистана*, 3(3), 21-26.
14. Курбанова З., Мамедов Э. (2024). Влияние образа жизни на развитие предраковых заболеваний полости рта у молодежи Узбекистана. *Научный вестник медицины*, 8(2), 30-37.
15. Мельников С., Петрова И. (2023). Влияние вейпинга на состояние слизистой оболочки рта: результаты проспективного исследования. *Российский медицинский журнал*, 28(7), 410-417.
16. Сидоров В., Лебедева О. (2022). Патогенетические механизмы развития никотинового лейкокератоза. *Бюллетень экспериментальной биологии и медицины*, 173(2), 152-160.
17. Федоров П., Зайцева Е. (2020). Влияние никотина на клеточные процессы слизистой рта. *Экспериментальная и клиническая фармакология*, 83(6), 45-51.
18. Козлова Н., Максимов А. (2024). Психологические аспекты отказа от электронных сигарет при лечении лейкокератоза. *Психосоматика и медицина*, 7(1), 22-28.
19. Smith J., et al. (2021). Impact of vaping on oral mucosa: a review. *J Oral Pathol Med*. 50(3): 215-222.
20. Lee H., et al. (2022). Nicotine leukoplakia and e-cigarette use: clinical observations. *Oral Dis*. 28(1): 34-41.
21. Zhang Y., et al. (2020). Immune response alterations in leukoplakia patients using e-cigarettes. *Clin Immunol*. 215: 108-115.
22. Kim S., et al. (2023). Prevalence of oral leukoplakia among young adults vaping: Korean cohort study. *BMC Oral Health*. 23: 105.
23. Johnson M., et al. (2024). Innovative therapies for leukoplakia: a clinical trial. *Oral Oncol*. 135: 105317.
24. Williams R., et al. (2022). E-cigarette associated oral mucosal changes: systematic review. *Tob Control*. 31(4): 457-464.
25. Nguyen T., et al. (2020). Cytological changes in oral leukoplakia caused by e-cigarettes. *Cytopathology*. 31(5): 412-420.