

HIV INFECTION AND AIDS: ETIOLOGY AND DENTAL PRACTITIONER TACTICS

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Abstract: This article provides a scientific analysis of the etiological characteristics of HIV infection and AIDS (Acquired Immunodeficiency Syndrome), the manifestations of the disease in the oral cavity, and the tactical approaches used by dental practitioners in their professional activities. The article covers the virological characteristics of HIV, mechanisms of its effects on the immune system, pathological changes occurring in the oral mucosa, and their differential diagnosis. Furthermore, it addresses issues of safety measures and clinical tactics when providing dental treatment to HIV-infected patients. Special attention is given to dental practitioners regarding early identification of disease signs, prevention of infection transmission, and professional safety requirements. The article presents scientific information of practical importance for medical professionals, particularly dental practitioners.

Keywords: HIV infection, AIDS, oral cavity pathology, dental tactics, infection control, immunodeficiency.

Introduction

Human immunodeficiency virus infection and its final stage, acquired immunodeficiency syndrome, remain significant medical and social problems on a global scale. According to the World Health Organization, more than forty million people worldwide are living with HIV, and new cases of infection continue to be recorded annually. This disease is of particular importance for dental practitioners, as changes in the oral cavity are often among the first clinical signs of HIV infection, which helps in early diagnosis of the disease.

HIV-infected patients are encountered regularly in dental practice, therefore every dental practitioner must have deep knowledge about the etiology, pathogenesis, clinical manifestations, and treatment tactics of this disease. In addition, strict adherence to professional safety measures and infection control principles during dental treatment is of critical importance for preserving the health of medical workers and preventing transmission of infection between patients.

Etiology of HIV Infection

HIV, or human immunodeficiency virus, belongs to the genus *Lentivirus* of the *Retroviridae* family. The virus was first isolated and identified by French scientists Luc Montagnier and Françoise Barré-Sinoussi in 1983. There are two main types of the virus: HIV-1 and HIV-2. HIV-1 is widely distributed throughout all regions of the world and is considered more pathogenic, while HIV-2 is found mainly in West Africa and causes relatively slower disease progression.

The HIV virion has a spherical shape with a diameter of approximately one hundred twenty nanometers. The virus has a complex structure consisting of a lipid envelope, a protein matrix, and genetic material. The genetic material consists of two copies of RNA strands, containing approximately nine thousand nucleotides. Glycoprotein molecules are located in the lipid envelope of the virus and play an important role in cell entry. The most important surface glycoprotein is gp120 and the transmembrane glycoprotein is gp41, which enable the virus to attach to CD4+ T-lymphocytes and other immune cells.

Pathogenesis and Effects on the Immune System

The pathogenesis of HIV infection is mainly associated with the progressive destruction of CD4+ T-lymphocytes by the virus. CD4+ T-lymphocytes are central coordinators of the immune system, and when their number and function decrease, the organism's ability to protect itself from infections and tumors is sharply reduced. In a healthy person, the number of CD4+ T-lymphocytes ranges between one thousand and two thousand per microliter of blood, but with the development of HIV infection, this indicator gradually decreases.

Three main stages of disease development can be distinguished. The first stage is the acute infection period, which begins two to four weeks after infection and manifests as a mononucleosis-like syndrome. During this period, the virus reproduces rapidly, viremia reaches high levels, and CD4+ lymphocyte counts drop sharply. The patient experiences fever, inflammation of the oral cavity and pharynx, enlargement of lymph nodes, skin rash, and general weakness. These symptoms persist for several weeks, then the immune system develops a response to the virus and clinical manifestations disappear.

The second stage is called asymptomatic or clinically latent period and can last from several years to ten years. During this period, the patient feels well and there are almost no external signs of disease. However, in the body, the virus continues to reproduce continuously and continues to destroy CD4+ lymphocytes. Although viremia is at relatively low levels, the process continues uninterrupted. Without antiretroviral therapy, this stage ultimately progresses to the third stage.

The third stage is AIDS or the advanced stage of the disease. During this stage, CD4+ lymphocyte counts fall below two hundred cells/mcL and the organism's immune system becomes severely weakened. As a result, opportunistic infections and tumors develop. Among these infections, pneumocystis pneumonia, cytomegalovirus infection, toxoplasmosis, tuberculosis, candidiasis, and other diseases are common. Additionally, tumors such as Kaposi's sarcoma and lymphoma may develop.

Oral Cavity Manifestations of HIV Infection

The oral cavity is one of the anatomical areas where early clinical signs of HIV infection frequently appear. Research shows that more than seventy percent of HIV-infected patients experience oral cavity pathology during the course of the disease. These changes are not only of diagnostic importance but also significantly reduce the patient's quality of life and impair eating and speech functions.

Oral candidiasis is one of the most common oral pathologies in HIV-infected patients. Candidiasis is mainly caused by the fungus *Candida albicans* and develops when the immune

system becomes weakened. The disease can manifest in pseudomembranous, erythematous, hyperplastic, and angular candidiasis forms. Pseudomembranous candidiasis or oral thrush is characterized by the appearance of white patches on the palate, which are easily removed and reveal a red inflamed mucosa underneath. Erythematous candidiasis appears as red patches, primarily observed on the tongue and hard palate. The appearance of candidiasis in the oral cavity often indicates that CD4+ lymphocyte counts have fallen below two hundred cells/mcL.

Periodontal diseases frequently occur in HIV-infected patients and may manifest as acute necrotizing ulcerative gingivitis or progressive periodontitis. Redness, swelling, and pain of the gingiva, rapid bleeding, and necrotic changes are observed. Sometimes the necrosis of gingival tissues may spread to deeper tissues and lead to osteonecrosis of the jaw bones. These conditions are extremely painful and seriously restrict the patient's ability to eat.

Herpes simplex virus infection manifests in the oral cavity as recurrent vesicles and ulcers. In HIV-infected patients, herpes infection lasts longer than usual, progresses more severely, and frequently relapses. The ulcers are painful and make it difficult to consume food. Additionally, cytomegalovirus, varicella-zoster virus, and other herpesviruses can also cause ulcers and erosions on the oral mucosa.

Diagnostic Approach for Dental Practitioners

The dental practitioner can play an important role in diagnosing HIV infection, as changes in the oral cavity are often among the first signs of the disease. When examining each patient, the dental practitioner must carefully collect a history and thoroughly examine the oral cavity. When collecting the history, it is necessary to obtain information about the patient's general health, past medical history, current medications, allergic reactions, and risk factors.

When examining the oral cavity, all anatomical areas must be examined sequentially and systematically. The lips, gingiva, inner cheek surface, tongue, palate, mouth floor, and area around the tonsils should be carefully inspected. Any pathological changes—discoloration, swelling, ulcers, spots, nodes, white patches—must be identified and fully described. The location, size, color, surface, and consistency of leukoplakia, erythroplakia, ulcers, tumors, or other abnormal formations should be recorded.

Oral cavity pathologies that should raise suspicion of HIV infection include persistent or treatment-resistant candidiasis, oral hairy leukoplakia, Kaposi's sarcoma, recurrent or prolonged herpes infection, acute necrotizing ulcerative gingivitis, unexplained rapid destruction of periodontal tissues, and non-Hodgkin's lymphoma. If any of these conditions are identified, the patient should be referred for additional testing and HIV infection should be ruled out.

Tactics and Treatment Principles for Dental Practitioners

Treatment of HIV-infected patients requires a comprehensive approach that considers not only the pathology of the oral cavity but also the patient's general condition, immune status, and antiretroviral therapy being administered. When formulating a treatment plan, the dental practitioner must work in collaboration with infectious disease specialists, immunologists, and other specialists.

Oral candidiasis is treated with both local and systemic antifungal preparations. In mild cases, nystatin suspension, clotrimazole tablets, or miconazole gel are used locally. In moderate and severe cases, fluconazole or itraconazole tablets are used systemically. The treatment course typically lasts from seven to fourteen days, though in some cases longer treatment may be necessary. After treatment, maintaining good oral hygiene and improving immune status are important for preventing relapses.

Herpes infection is treated with antiviral preparations, mainly acyclovir, valacyclovir, or famciclovir. It is important to begin treatment as early as possible, as this shortens the duration of the disease and reduces complications. In severe cases or when immunodeficiency is profound, intravenous acyclovir may be used. In patients with recurrent herpes infection, prophylactic treatment may be necessary.

Treatment of periodontal diseases requires a comprehensive approach. First, oral hygiene measures must be improved, professional cleaning performed, and microbial plaque removed. In cases of acute necrotizing ulcerative gingivitis, antibiotics are prescribed (metronidazole or amoxicillin-clavulanate combination). Local anesthesia and analgesic preparations are used for pain relief. Regular dental supervision and supportive therapy play an important role in preventing relapses.

Special care must be taken regarding anesthesia. Local anesthesia is generally considered safe, but caution is needed with epinephrine, as some antiretroviral medications may affect epinephrine metabolism. If general anesthesia is necessary, consultation with an anesthesiologist and infectious disease specialist is required. Complete information about all medications the patient is taking is essential, as antiretroviral drugs may interact with other medications.

Psychological Support and Counseling for Patients

HIV-infected patients often experience stigmatization, discrimination, and psychological stress. The dental practitioner must show respect, compassion, and maintain confidentiality when communicating with patients. The patient's diagnosis should be known only to medical personnel who need it for treatment purposes and should never be disclosed. The patient should feel safe and accepted.

It is necessary to provide patients with detailed counseling regarding oral hygiene, nutrition, and general health maintenance. Regular toothbrushing, flossing, and abstaining from alcohol and tobacco products are important for maintaining oral health. Proper nutrition and adequate consumption of vitamins and minerals help support the immune system. Stress management techniques and regular physical activity are also beneficial for overall health.

Improving professional training of dental practitioners remains an important direction. In medical universities and continuing education courses, HIV infection, its manifestations in the oral cavity, and professional safety issues should be studied in greater depth. An interdisciplinary approach and cooperation among various specialists can significantly increase the effectiveness of patient treatment.

Conclusion

HIV infection and AIDS remain urgent problems in modern medicine and are of particular importance for dental practitioners. Because the oral cavity is often the site where early clinical signs of the disease appear, dentists play an important role in early detection of HIV. Having deep knowledge about the disease's etiology, pathogenesis, and oral manifestations, applying correct diagnostic approaches, and selecting effective treatment tactics are professional obligations of every dental practitioner.

Treatment of HIV-infected patients requires a comprehensive approach, cooperation with other specialists, consideration of the patient's immune status, and development of an individual treatment plan. Strict adherence to professional safety measures and infection control principles ensures the safety of not only medical workers but all patients. Providing services to all patients according to the same high standards based on universal precaution principles is a fundamental requirement of modern dentistry.

Established relationships of trust with patients, psychological support, and maintenance of confidentiality are integral parts of treatment that help improve the patient's quality of life and foster a positive approach to treatment. Modern antiretroviral therapy and timely provision of dental care enable HIV-infected patients to lead full lives and maintain oral health.

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