



Viral Infections Of The Oral Cavity: A Comprehensive Review

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ABSTRACT:

Viral infections of the oral cavity typically present as ulcerations or blisters, posing diagnostic challenges in dental practice. Herpesviruses, herpes simplex virus, and other viral agents are responsible for primary oral lesions. Additionally, viruses such as HIV, varicella, and cytomegalovirus can affect the oral cavity due to immune system weakness. Notably, COVID-19 patients have also been reported to exhibit oral manifestations. This review aims to provide a comprehensive overview of viral infections affecting the oral cavity, highlighting their clinical presentation, diagnosis, and management.

Key words : viral infection , oral disease, ulcers, herpes

1.INTRODUCTION

Various viruses, including human herpes viruses and newly identified strains like Sars CoV-2, can infect the oral mucosa, leading to either localized disease symptoms or facilitating viral transmission through bodily fluids such as saliva.^[1] The clinical presentation of viral oral mucosal infections can vary significantly, ranging from mild, inconspicuous lesions to more severe manifestations, such as redness, swelling, blistering, and ulcerations, as well as hyperkeratotic changes, making clinical diagnosis challenging^[1]

The pathogenesis of viral diseases can be attributed to two primary mechanisms: cytopathic effects resulting from viral replication and immunopathological responses triggered by viral proteins. Viral infections have been implicated in the pathogenesis and progression of periodontal diseases^[2]

Oral diseases can be caused by primary viral infections, including HSV and HPV. Moreover, viral-induced immunosuppression, as seen with HIV, can predispose individuals to secondary oral mucosal infections. COVID-19 has been associated with various oral lesions, including nonspecific ulcerations, desquamative gingivitis, petechiae, and coinfections such as candidiasis^[3]. Oral diseases can result from various viral infections. HSV-1 causes gingivostomatitis and remains dormant in the trigeminal ganglion. HIV and other blood-borne viruses can enter the mouth through gingival crevicular fluid. Viruses responsible for upper respiratory tract infections are also found in the oral cavity. The mumps virus infects the salivary glands, and HPV is linked to several oral conditions and head and neck squamous cell carcinoma^[4]. The following sections build upon this introductory overview of oral viral infections, presenting a comprehensive review of the primary viral pathogens that infect the oral cavity.

2. VIRAL DISEASES ASSOCIATED WITH ORAL CAVITY:

The human herpesvirus (HHV) family comprises eight complex viruses that cause primary oral mucous membrane infections and may contribute to periodontitis. Notable members include HSV-1, HSV-2, EBV, and KSHV. Additionally, HPV is a diverse viral family associated with various pathologies, including oral squamous cell carcinoma. The retrovirus HIV can lead to immunocompromisation, resulting in cutaneous manifestations^[4]

2.1 HERPES SYMPLEX VIRUS

HSV-1 exhibits a high degree of persistence in humans, with primary infection typically occurring during early childhood. Commonly affecting children between 2 and 4 years old^[1]

HSV-1 persistence is characterized by recurrent clinical infections in 20-40% of the population, with seroprevalence rates of 70-90% among adults. The virus evades complete elimination by the host's immune response, allowing for reactivation and recurrent symptoms. However, the latency of HSV-1 is regulated by the individual's CD8+ T cell response, which inhibits viral reactivation and promotes antigenic control^[1]

HSV-1 and HSV-2 are two distinct types of herpes viruses that can be differentiated by their unique antibody profiles. HSV-1 is primarily associated with infections of the pharynx, meningoencephalitis, and dermatitis above the waist, whereas HSV-2 is predominantly linked to genital and anal infections^[2]

Primary herpes infections, including HSV-1, are often accompanied by prodromal symptoms such as fever, headache, and malaise. In the oral cavity, the initial infection is often asymptomatic or presents as acute gingivostomatitis, HSV-1 infection can cause vesicles, ulcerations, and acute marginal gingivitis, typically following a prodromal phase^[2]. For the treatment of HSV infections, acyclovir (ACV) is the drug of choice due to its efficacy and safety profile^[4]

2.2 VARIZELLA ZOSTER VIRUS

Varicella zoster virus (VZV) is a strictly human pathogen that causes chickenpox (varicella) upon primary infection, with most individuals contracting the disease before reaching adulthood due to its high transmissibility^[1]. Varicella zoster virus (VZV) is responsible for both primary and recurrent infections, and it establishes latency in neurons within sensory ganglia. The virus has an incubation period of approximately 14 days^[2]. The clinical manifestations of chickenpox include exanthema, enanthema, and oral ulcers on the buccal mucosa, gingiva, and palate, which are similar to aphthous ulcers but tend to be less symptomatic^[1]

Varicella-zoster virus (VZV) causes both primary and recurrent infections and remains latent in neurons within sensory ganglia. The incubation period is about 2 weeks. VZV is responsible for two major clinical infections: chickenpox as the primary infection and shingles as the recurrent infection.

Chickenpox is primarily transmitted through nasopharyngeal secretions or direct contact with skin lesions. Oral manifestations are characterized by small, blister-like lesions on the oral mucosa, similar to primary HSV vesicles. However, these oral lesions are relatively insignificant in terms of symptoms, diagnosis, and

management. Potential complications of chickenpox include serious conditions such as encephalitis, pneumonitis, Reye's syndrome, and Guillain-Barré syndrome. ^{[6][2]}

2.3 INFECTIOUS MONONUCLEOSIS

Epstein-Barr virus (EBV) infection among adolescents and young adults is primarily transmitted through deep kissing. In rare cases, primary EBV infection can also be spread through blood transfusion, solid organ transplantation, or hematopoietic cell transplantation. The incubation period of infectious mononucleosis ranges from 32 to 49 days. ^[6]

Infectious mononucleosis, a clinical entity characterized by pharyngitis, cervical lymph node enlargement, fatigue, and fever, is caused by EBV infection. The disease is a global health issue, with no seasonal variation. Notably, the immune response to EBV in adolescents may be influenced by cross-reactive memory CD8+ T cells, such as those specific to influenza. No approved treatment for infectious mononucleosis, Corticosteroids are sometimes used to manage inflammatory complications, such as airway obstruction, or autoimmune phenomena, including anemia and thrombocytopenia, associated with infectious mononucleosis. However, their effectiveness is debated, and they may potentially hinder viral clearance ^{[6][2]}

2.4. CYTOMEGALOVIRUS

Cytomegalovirus (CMV) infection often presents with nonspecific symptoms, including fever and asthenia, and less frequently, dermatological involvement, which may manifest as ulcerations. CMV ulcerations can occur throughout the oral mucosa, with a predilection for the hard and soft palate. These ulcers are often single or multiple, deep, and painful, characterized by raised and erythematous edges. Diagnosis is confirmed through viral DNA detection via blood PCR or immunohistochemical examination by biopsy, which detects CMV antibodies. Antiviral medications, including Aciclovir, Ganciclovir, and Valganciclovir, are the preferred treatment for CMV infection, regardless of its clinical presentation. Additionally, local care may be necessary for oral ulcerations to manage pain ^{[7][2]}

2.5. ENTEROVIRUSES

Human enteroviruses (HEVs), comprising Coxsackievirus A (CVA), Coxsackievirus B (CVB), echovirus (ECV), and other enterovirus (EV) serotypes, are primarily transmitted through the fecal-oral route and contact with contaminated throat discharges or blister fluid. Diagnostic procedures for HEV infections typically involve the amplification of a highly conserved 5' non-coding region (NCR), a genetic sequence common to most enteroviruses. RT-PCR assays targeting the VP1 region have been developed for HEV serotyping. ^[12]

2.6. MUMPS (EPIDEMIC PAROTITIS)

Mumps is a viral infection caused by the mumps virus (MuV), a member of the Paramyxoviridae family of RNA viruses. Following an incubation period of 12-24 days, the virus primarily affects the parotid glands, leading to symptoms such as salivary gland swelling, fever, and fatigue. Vaccination is the most effective method for preventing complications associated with mumps, as there is no specific treatment available for the disease, only management of symptoms. ^[10]

2.7 RUBELLA (GERMAN MEASLES)

Congenital Rubella Syndrome (CRS) occurs when a pregnant individual is infected with the Rubella virus, a member of the Togaviridae family. Once the virus is transmitted to the fetus, it can severely disrupt fetal development

Patients with Congenital Rubella Syndrome (CRS) often require special dental care due to exacerbated oral health issues, which can be attributed to limited manual dexterity and inadequate preventive care. Intraoral examination typically reveals widespread dental caries, and in some cases, congenital tooth agenesis. Symptomatic relief can be achieved through dental excavation and temporary restorations. ^[9]

2.8. MEASLES (RUBEOLA)

Koplik spots, characterized by small white spots on a reddish background resembling salt grains, were observed on the buccal mucosa, diagnosis of measles can be confirmed by the detection of anti-measles IgM antibodies.^[8] The most effective way to prevent measles is through vaccination with the measles, mumps, and rubella (MMR) vaccine. anti viral treatment with Ribavirin and vitamin A are effective to reduce the risk of complications and death.^[8]

2.9. HUMAN IMMUNODEFICIENCY VIRUS AND ACQUIRED IMMUNODEFICIENCY SYNDROME

The presence of oral lesions in HIV-infected patients is a significant clinical feature, occurring in up to 50% of cases, and increasing to 80% in AIDS patients. These lesions can facilitate early testing, diagnosis, and treatment of HIV/AIDS. HIV/AIDS patients frequently develop oral candidiasis, with a wide range of reported prevalence (17-75%). While *Candida albicans* is the most common causative agent, other *Candida* species, including *C. glabrata* and *C. tropicalis*, may also contribute to the development of oral candidiasis.^[11]

The oral clinical manifestations associated with *Candida* infections can be diverse, but are mainly classified into three primary clinical forms: pseudomembranous candidiasis, erythematous candidiasis, and angular cheilitis. HIV/AIDS is commonly associated with a range of oral lesions, including oral candidiasis, hairy leukoplakia, Kaposi's sarcoma, and several periodontal and mucosal conditions, highlighting the importance of oral health monitoring in HIV/AIDS patients.^[11]

Additional oral manifestations associated with HIV/AIDS include atypical ulcers, salivary gland diseases, and various viral infections, such as cytomegalovirus, herpes simplex virus, human papillomavirus, and varicella-zoster virus.

Zidovudine (AZT), approved in the United States in 1986, was the first anti-HIV agent; however, the antiretroviral therapy (ART) landscape has evolved significantly, with the introduction of novel drug classes, long-acting formulations, and innovative delivery systems.^[11]

CONCLUSION

Viral infections affecting the oral cavity constitute a pressing concern within dental practice, necessitating a multifaceted and interdisciplinary approach to accurate diagnosis, effective management, and optimal patient care. To enhance our comprehension of the complex pathogenesis, clinical manifestations, and therapeutic outcomes associated with these infections, sustained investment in rigorous scientific research is imperative. Ultimately, this endeavor will facilitate the development of innovative, evidence-based management strategies, thereby improving the quality of life for individuals affected by viral oral infections

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