Textbook of Oral and Maxillofacial Surgery

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Chapter 10

Special infections and their surgical relationship

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When performing surgical procedures within the oral cavity, the surgeon must be aware that the tissue surfaces harbor microbiota. Although the microbial flora is complex, containing overtly pathogenic strains of microbes, natural body defense mechanisms allow the patient to successfully be healed of wounds in the oral cavity. But despite the patient's ability to withstand potentially harmful sequelae, the surgeon is still confronted with a varying incidence of infected lesions.

Since the microbial flora is so varied, diagnosis of infected wounds can be troublesome, particularly if the commonly used antibiotics having gram-positive activity fail to resolve the infection. Although it is stressed that culturing techniques be used to avoid these pitfalls, the isolation of the specific organism responsible for the infection from the vast array of microbes present within the tissues cannot always be accomplished. The specimen sent for laboratory analysis is usually contaminated, and standard laboratory analysis does not always consider the more exotic species, the potential pathogens as they are called. In addition, bacteria are not always responsible; fungi and viruses must be considered, as well as diseases of unknown etiology that can mimic the clinical appearance of the more common infections encountered. This chapter will be concerned with this diagnostic situation as well as the special care and considerations needed to manage these patients.

Gram-Negative Infections

In the literature, authors have reported the presence of gram-negative organisms causing infections within the oral cavity. Enteric gram-negative rods are normally found within the intestinal tract of man. When they are present in the oral cavity, gram-negative organisms are considered to be a contaminant. The possibilities of dealing with this vast array of organisms should never be ignored, particularly when an infectious process does not seem to be responding quickly to penicillin or other antibiotics having predominantly gram-positive spectra. This is perhaps more significant in debilitated patients. Culturing techniques can identify these organisms, and a suitable antibiotic regimen can be chosen. Since many antibiotics having gram-negative activity possess nephrotoxic or ototoxic properties or both, their use must be well specified. In addition, adequate incision and drainage must not be overlooked. It is essential to avoid the development of endotoxin shock, which can be fatal. Only by early suspicion, quick and vigorous drug therapy, and adequate incision and drainage will this situation be avoided.

Anaerobic Infections

In anaerobic infections the clostridia, a group of anaerobic, gram-positive, spore-forming rods are the most dangerous. In particular, *Clostridium tetani,* the agent causing tetanus or lockjaw, and the clostridia causing gas gangrene are the most important pathogens contaminating wounds.

C. tetani are found in soil throughout the world. Spores infect the wound and develop into the bacilli, which produce a neurotoxin. This toxin causes the disease state of tetanus. Fortunately, only one antigenic type of toxic is involved, and an effective monovalent toxoid for prophylactic immunization has been developed. Since tetanus immunization is so widespread in this country, few cases are seen.

Because these organisms are anaerobic, thus having predilection to necrotic wounds, routine cleaning of wounds with resultant bleeding and oxygen perfusion suppresses their growth. This is particularly true within the mouth where tissues are highly vascularized. However, in traumatic injuries with penetration into deep tissue spaces, only adequate immunization can protect the patient. Should tetanus be suspected, massive doses of intravenous aqueous penicillin (10 million units per day), along with the administration of 3.000 to 6.000 units of human immune globulin, are indicated. Additional patient management involves airway assistance, bowel, and bladder functions, and sedation of the patient to control seizures and convulsions.

The clostridia of gas gangrene are chiefly *Clostridium perfringens, C. novyi,* and *C. septicum.* Although the classic description of a crepitant, gas-filled wound is most frequently given, the condition may be manifested in different ways. Hence, like tetanus, gas gangrene should always be suspect in penetrating wounds and proper precautions taken. Whenever pain suddenly is felt around the site of soft tissue injury or the pain suddenly intensifies, gas gangrene should be suspected. Wide, radical surgical debridement with massive doses of intravenous penicillin and tetracyclines must be undertaken. Polyvalent antitoxin should also be administered. Hyperbaric oxygen techniques have been employed successfully, but this requires special facilities not readily available.

Bacteroids, a group of nonspore-forming, strictly anaerobic, gram-negative bacteria, have recently been implicated in oral infections as a result of better isolation techniques and renewed interest in anaerobic organisms. *Bacteroids* species are normal inhabitants of the respiratory, genital, and intestinal tracts. They are rarely involved alone in disease but are almost always associated with underlying debilitating disease or trauma impairing the host defense mechanisms. *B. fragilis* and *B. melaningenicus* are found within the oral cavity and have been implicated as the cause of osteomyelitis of the mandible.

Bacteroids infections can only be identified by employing anaerobic culturing techniques. Treatment with penicillin and tetracycline gives only haphazard results, with resistant strains appearing. Chloramphenicol is considered an effective agent, but clindamycin has been shown to be effective and offers a safer alternative to chloramphenicol therapy. Metronidazole has been shown to be bactericidal in vitro.

Fungal Infections

The most commonly encountered fungal infection of the oral cavity is moniliasis, which is characterized by white, adherent patches on the oral mucosa. Pain, soreness, and disturbances in taste sensation are frequently noted. The etiological agent, *Candida albicans,* is normally present within the oral cavity. Monilial infections are caused by overgrowth of these organisms, which is a result of either debilitation of the patient or of chemotherapeutic agents affecting the balance of the oral flora. Most typical is the appearance of moniliasis after the use of broad-spectrum antibiotics such as the tetracyclines.

The diagnosis of moniliasis depends on the surgeon recognizing its clinical appearance as well as obtaining a specimen for culture and identification. A direct smear will reveal gram-positive, oval, budding yeasts and gram-positive, budding cells that are similar to hyphae. These fungi will grow on Sabouraud's glucose agar.

The treatment of oral monilial infections involves the use of nystatin suspension. These infections respond rapidly to the administration of 100.000 to 300.000 units nystatin held in the mouth for 3 minutes, then swallowed; this regimen is repeated three to four times daily. Recognizing the underlying causes of these infections is most important because monilial infections will return unless these causes are corrected.

Actinomycosis manifests itself as a chronic granulomatous lesion with fistula formation and pus production. Cervicofacial actinomycosis accounts for approximately 60% of all actinomyces infections. The remaining infections involve the abdominal and thoracic areas. The cause of actinomyces is believed to be the endogenous spread of *Actinomyces israelii,* a gram-positive, nonacid-fast, nonmotile, filamentous organism found within the oral cavity. *A. bovis,* a closely related species, may also cause the disease. These two species are of interest for identification purposes only.

A history of trauma or one of tooth extraction is commonly found in patient with actinomycosis. The tongue is involved in roughly 4% of all forms of the disease. The tongue lesions must be distinguished from neoplasms, tuberculous lesions, syphilitic gummas, or other fungal lesions. Whenever a chronic infectious process occurs after tooth extraction and does not readily respond to the usual modes of treatment, actinomycosis should be suspected.

Diagnosis of this disease depends on the identification of the organisms from cultures taken from the pus of the draining lesions or from biopsy specimens of the lesions. The pathognomonic findings of sulfur granules can be obtained by placing one granule on a slide and crushing it under a cover slip. The typical appearance of the organism will be readily observed.

There are various opinions concerning the choice of antibiotics for treatment of this infection. Some practitioners recommend penicillin, and others recommend tetracyclines. Generally this infection requires massive doses of either antibiotic (a minimum of 3 to 4 million units penicillin or 500 mg tetracycline every 6 hours) over prolonged periods of time. The antibiotic must be continued weeks after clinical resolution of the disease. Surgical drainage of the abscess cavity must be accomplished and forms a vital part of the treatment plan.

Blastomycosis is a fungal infection of the skin and viscera. However, lesions have been reported within the oral cavity. Two types of infections are recognized: North American blastomycosis caused by *Blastomyces dermatitidis* and South American blastomycosis caused by *Paracoccidioides brasiliensis.* Most cases of North American blastomycosis are found in the southeastern United States and the Mississippi River Valley. Both forms produce firm, erythematous, ulcerative lesions, with massive regional lymphadenopathy.

Since clinical and epidemiological features are nonspecific, diagnosis depends on isolation and identification of the specific organism from these lesions. The accuracy of skin tests for blastomycosis is questionable.

Treatment of these infections depends on the use of amphotericin B along with surgical excision of the destroyed tissues. South American blastomycosis responds to sulfa drugs.

Histoplasmosis is a fungal infection that is caused by *Histoplasma capsulatum,* with cutaneous and pulmonary lesions. The pulmonary infection may lead to a more overwhelming systemic infection with resultant multiplication of the organisms within the reticuloendothelial cells and anemia, fever, hepatomegaly, splenomegaly, leukopenia, ulcerative lesions of the gastrointestinal tract, and adrenal necrosis. Oral manifestations of histoplasmosis involving the lips, tongue, nose, and larynx seem to occur mainly in adults and are seen in about one third of all fatal cases. Many cases of histoplasmosis go unnoticed with minimal consequences. It is only in the chronic localized forms of the condition that two main clinical types occur. One is pulmonary and resembles tuberculosis in all respects; the other is mucocutaneous, with ulcers of the mouth, tongue, pharynx, penis, and bladder. These ulcers are painful, granulomatous lesions, with associated regional lymphadenopathy.

Diagnosis of disseminated or chronic localized histoplasmosis can be made from cultures of blood, bone marrow, biopsied lesions, sputum, or exudate obtained form the ulcerated lesion. *H. capsulatum* will grow on Sabouraud's medium. Complement fixation tests and a histoplasmin skin test are available, with the latter resulting in a delayed hypersensitivity reaction similar to the tuberculin skin test. Unfortunately, false negative are numerous. Histopathological examination of tissue lesions is another proved method of diagnosis for histoplasmosis.

Amphotericin B given intravenously in dosages of between 50 and 100 mg daily has been shown to be effective in treating most patients with histoplasmosis. Sulfadiazine has also been shown to be effective for some adult patients and can be given in conjunction with amphotericin B.

Tuberculosis

Although oral lesions of tuberculosis are rare, these granulomatous ulcerations can easily be misdiagnosed as fungal infection, carcinoma, gumma, or chancre. These lesions are usually extremely painful, with a predilection for the tongue, although the cheeks, lips, and palate have also been reported as areas of involvement.

Mycobacterium tuberculosis, the infectious agent, is a rod-shaped bacterium that is rendered acid-fast when stained by the Ziehl-Neelsen technique. Another characteristic of the tuberculous lesion is the development of chronic granulomas with central areas of caseation necrosis. Within the center of this lesion are multinucleated giant cells containing the tubercle bacilli.

The diagnosis of oral tuberculous lesions is not easily achieved unless the Ziehl-Neelsen stain is employed. Ordinary histopathological study is inconclusive. Unless special culture methods are requested, these organisms will not grow using ordinary methods. When the diagnosis is made, however, it then becomes imperative to examine the chest for pulmonary lesions and the other organ systems for possible involvement.

In addition to the oral lesions just described, another form of tuberculosis, which is characterized by marked lymphadenopathy of the cervical nodes, may present itself to the dentist. This tuberculous involvement of the cervical lymph nodes is called scrofula and was frequently associated with drinking unpasteurized raw milk from tuberculous cows. The major salivary glands may also be involved, making a differential diagnosis between tuberculosis, mixed tumor, and malignancy difficult. Diagnosis is made by histopathological examination.

Treatment of choice for these tuberculous lesions is administration of isoniazid, streptomycin, and para-aminosalicylic acid (PAS). For the more seriously infected patients, isoniazid and PAS are used concurrently to prevent the appearance of resistant strains.

Syphilis

Despite improved methods for treating syphilis, every year the number of reported cases of infectious syphilis continues to rise at an alarming rate. In 1968, 75.000 cases were estimated in the USA. A complete discussion of syphilis is not suited for this text, but it is highly recommended that every dentist consult a standard reference text and familiarize himself or herself with this disease.

Briefly, syphilis is divided into the primary, secondary, and tertiary stages. The chancre is associated with the primary stage; the macular-papular skin rash and raised, grayish erosions of the mucosa (mucous patches) are associated with the secondary stage; the gumma, a chronic granulomatous lesion, is associated with the tertiary stage.

The chancre, which is an indurated solitary ulceration with dark encrustations, is generally found about the genitalia, although oral lesions of the gingiva, tongue, and pharynx have been reported. The painful mucosal erosions of the secondary stage, the mucous patches, are highly infectious and represent a potential source of infection to the dentist and the assistants. These lesions are commonly found on the tongue, lips, buccal mucosa, and pharynx. The gumma, which is a painless, granulomatous lesion that ulcerates and undergoes central necrosis, is commonly found within the tongue or on the palate. Perforations of the palate and nasal septum are associated with these lesions. The syphilitic interstitial glossitis associated with advanced leukoplakia is often considered a precancerous lesion and should be viewed with suspicion. It must be stressed that syphilis has often been called the "great mimic", and one's suspicion should always be aroused when confronted with unusual case

presentations. For this reason as well as for public health measures, serological testing for syphilis is widely employed on a regular screening basis.

Diagnosis of syphilis relies on serological test, dark-field microscopic examination, and histopathological examination. Briefly, serological tests are negative during the first stage (when dark-field examination should be employed), positive during the second stage, and equivocal during the third stage. Of the serological tests, the most frequently employed is the Venereal Disease Research Laboratory (VDRL) slide test, which is a nontreponemal flocculation test. The Kolmer test, another nontreponemal test, relies on complement fixation. These tests are associated with false positive results but are useful during treatment because the titers observed parallel the infectious course.

Treponemal tests generally employed are the *Treponema pallidum* immobilization test (TPI) and the fluorescent treponemal antibody (FTA) test. These tests are generally more specific than the nontreponemal tests. The most specific treponemal test for diagnostic purposes, seems to be the fluorescent treponemal antibody absorption (FTA-ABS) test. But this too is not without occasional false positive results, particularly for those patients with increased or abnormal globulins.

Treatment of syphilitic patients is a public health measure. Penicillin is still the first drug of choice; a single injection of 2.4 million units of benzathine penicillin is often curative. Another schedule recommends procaine penicillin, 600.000 units daily for 8 to 10 days. Other alternatives to penicillin include tetracycline, erythromycin, and cephaloridine.

Erythema Multiforme

Erythema multiforme is a vesicular, bullous lesion of unknown etiology. The sudden onset of large bullous lesions, which are relatively nonpainful but frequently are secondarily infected by the time they affect the oral mucous membranes, is typical of the disease. In addition, the extremities, the face, and the neck may be involved. Spontaneous remission occurs in 2 to 3 weeks after considerable discomfort, encrustation, and bleeding from these lesions. Commonly, erythema multiforme is associated with high temperature (102° to 105°F or 38.8° to 40.5°C) and joint pain. This disease is frequently associated with drug eruptions caused by drugs such as antisera, sulfonamides, quinine, and arsenicals.

Various entities of this disease have been described, helping to confuse the issue. The Stevens-Johnson syndrome occurs in the younger age group, with accompanying high fever, headache, and overwhelming stomatitis. Other mucous membranes may be involved, leading to conjunctivitis, urethritis, and balanitis. Arthralgia and myalgia are common. Behçet's syndrome involves erosive lesions of the eye, with oral and genital lesions. Reiter's syndrome includes acute arthritis manifestations along with the triad of conjunctivitis, oral lesions, and urethritis.

Treatment is symptomatic with no known cure. Oral hygiene, bland mouthwashes, antibiotics to control secondary infection, and systemic steroids when indicated for severe cases are the treatment measures usually employed.

Herpetiform Lesions

Because so much has been written about oral herpes simplex and recurrent aphthous ulcers, they will be discussed briefly in this chapter. These recurrent mucosal and lip lesions are self-limiting and regress in 10 to 14 days. Although the etiological agent in herpes is known (the herpes simplex virus), speculation still exists concerning the etiological agent of recurrent aphthous ulcers.

Herpetic lesions frequently occur after upper respiratory illnesses, gastrointestinal upsets, and menstrual disorders. It is important to avoid steroid therapy whenever herpes simplex infection is suspected for fear of dissemination, particularly to the conjunctiva and central nervous system. Idoxuridine (IDU), although shown to be effective with herpes simplex keratitis, has been a disappointment in the treatment of herpes labialis.

Aphthous ulcers (canker sores) still remain an enigma to treat because of their obscure etiology. Social and economic factors, psychic tension, autoimmune mechanisms, and L-forms (pleuropneumonia-like organisms or PPLO, *Mycoplasma* organisms) have all been implicated. Since these are spontaneously regressing lesions, patient comfort is strived for during the acutely painful episodes. Various regimens of multivitamins, steroids, and topical tetracycline and repeated smallpox vaccinations have been suggested with varying claims of success. Generally the simplest palliative therapy is suggested, with care to control secondary infections if they should arise.

Clinical entities such as pemphigus, mucous membrane pemphigoid, periadenitis mucosa necrotica recurrens, herpes zoster, and herpangina are similar, regarding treatment modalities, to oral herpes simplex and aphthous ulcers. In herpes zoster the etiological agent is the varicella virus, and in herpangina it is the Coxsackie virus. Causes of the other clinical entities listed are unknown. In all cases these ulcerative lesions of the oral mucous membranes should be treated symptomatically in the simplest manner. Although the viral infections are self-limited and regress, the other entities may follow a chronic course. When this is the case, steroid therapy may be tried, usually being reserved for the most difficult cases. However, steroids do not always bring about resolution, although they may retard the course and progression of these ulcerative lesions.