

Actinomycosis

Pathophysiology and Hyperbaric Effects

Actinomycosis, a bacterial infection characterized by chronic inflammatory induration and sinus formation, presents clinical challenges. First, the infection eludes diagnosis because etiologic agents are bacteria and not fungi, a fact not yet well known. Second, clinicians must employ special anaerobic techniques to culture the causative micro-organisms. *Actinomyces* are indigenous to the oral and intestinal microflora. Therefore, culture of the micro-organism from these sites does not establish the diagnosis by itself. Actinomycotic lesions frequently involve other bacteria. Unfortunately, the presence of multiple bacterial organisms makes the primary isolation of *Actinomyces* more difficult. Because the micro-organisms involved are exquisitely sensitive to penicillin and other broad spectrum antibiotics, empiric antimicrobial therapy may mask clinical manifestations.

Actinomycotic lesions most commonly involve the face and neck (63 percent of cases), the thorax (15 percent) and ileocecal regions (22 percent). Pelvic actinomycosis, now reported with increasing frequency, is associated with the use of intrauterine devices. Cervicofacial actinomycosis is the most common form of the disease, however. The lesion typically begins as a painful, indurated swelling one to several weeks after dental extraction or trauma to the mouth. Frequently located at the angle of the jaw, the mass gradually proceeds to suppurate, then drain from multiple extraoral sinuses. Poor oral hygiene, dental caries, and minor endoral trauma remain the major predisposing conditions.

Pulmonary actinomycosis is usually secondary to aspiration; less commonly it is secondary to hematogenous dissemination. Pneumonia develops, and it tends to invade the pleura, resulting in empyema necessitatis, and fistula draining through the chest wall. With empyema formation, erosion of adjacent ribs frequently results. Actinomycosis of the lung and pleura become more complicated when the mediastinum, pericardium, thoracic vertebrae, or subphrenic spaces become infected.

Actinomycosis of the gastrointestinal tract most commonly develops in the ileocecal region, but the infection can also arise in the gastric or anorectal areas. Patients with the disease often show a previous history of appendicitis.

Actinomycotic infection of the bone is usually a result of an adjacent soft tissue infection (75 percent), but may be associated with trauma (e.g. fracture of the mandible (19 percent), or it may be hematogenous (3 percent). Infection involving the facial bones, especially the mandible, represents the most frequent site affected. The disease also occurs in the skull, ribs, clavicle, sternum, scapula or pelvis generally due to extension of oral facial, thoracic, or abdominal disease.

The oxygen tension in infected soft tissue is low. Hyperbaric oxygen therapy (HBOT) increases the tissue oxygen tension in infected tissues. During HBOT therapy, the increase in the oxygen tension leads to elevation of the concentration of superoxide. This condition occurs in both intracellular and extracellular spaces. Increased superoxide levels lead to the production of hydrogen peroxide, and other toxic oxygen-derived radicals. Anaerobic organisms, including those causing actinomycosis, are extremely sensitive to these toxic oxygen radicals. (Most anaerobes lack the enzyme for degrading superoxide dismutase, and the hydrogen peroxide-degrading enzyme, catalase.) Thus, an increase in oxygen tension with subsequent oxygen radical formation often proves lethal for most anaerobic organisms. Favorable clinical results have been reported with adjunctive HBOT therapy in refractory actinomycosis. HBOT must be used only as an adjunct to accepted antimicrobial treatment and surgical care.

References

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