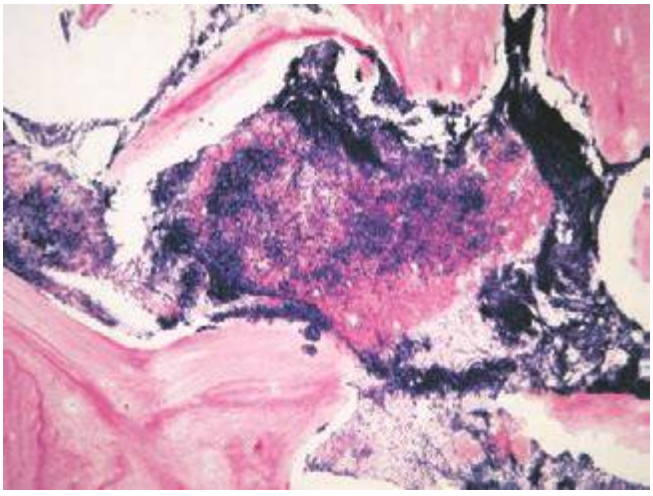


FIGURE 200-1 Bisphosphonate-associated maxillary osteomyelitis due to *A. viscosus*. A sulfur granule is seen within the bone. *(Reprinted with permission from NH Naik, TA Russo: Bisphosphonate related osteonecrosis of the jaw: The role of Actinomyces. Clin Infect Dis 49:1729, 2009. © 2009 University of Chicago Press.)*

Mediastinal infection is uncommon, usually arising from thoracic extension but rarely from perforation of the esophagus, trauma, or extension of head and neck or abdominal disease. The structures within the mediastinum and the heart can be involved in various combinations; consequently, the possible presentations are diverse. Primary endocarditis (in which *A. neuii* has been increasingly described) and isolated disease of the breast occur.

Abdominal Disease Abdominal actinomycosis poses a great diagnostic challenge. Months or years usually pass from the inciting event (e.g., appendicitis, diverticulitis, peptic ulcer disease, spillage of gall stones or bile during laparoscopic cholecystectomy, foreign-body perforation, bowel surgery, or ascension from IUCD-associated pelvic disease) to clinical recognition. Because of the flow of peritoneal fluid and/or the direct extension of primary disease, virtually any abdominal organ, region, or space can be involved. The disease usually presents as an abscess, a mass, or a mixed lesion that is often fixed to underlying tissue and mistaken for a tumor. On CT, enhancement is most often heterogeneous and adjacent bowel is thickened. Sinus tracts to the abdominal wall, to the perianal region, or between the bowel and other organs may develop and mimic inflammatory bowel disease (Chap. 351). Recurrent disease or a wound or fistula that fails to heal suggests actinomycosis.

Hepatic infection usually presents as one or more abscesses or masses (Fig. 200-3). Isolated disease presumably develops via hematogenous seeding from cryptic foci. Imaging and percutaneous techniques have resulted in improved diagnosis and treatment.

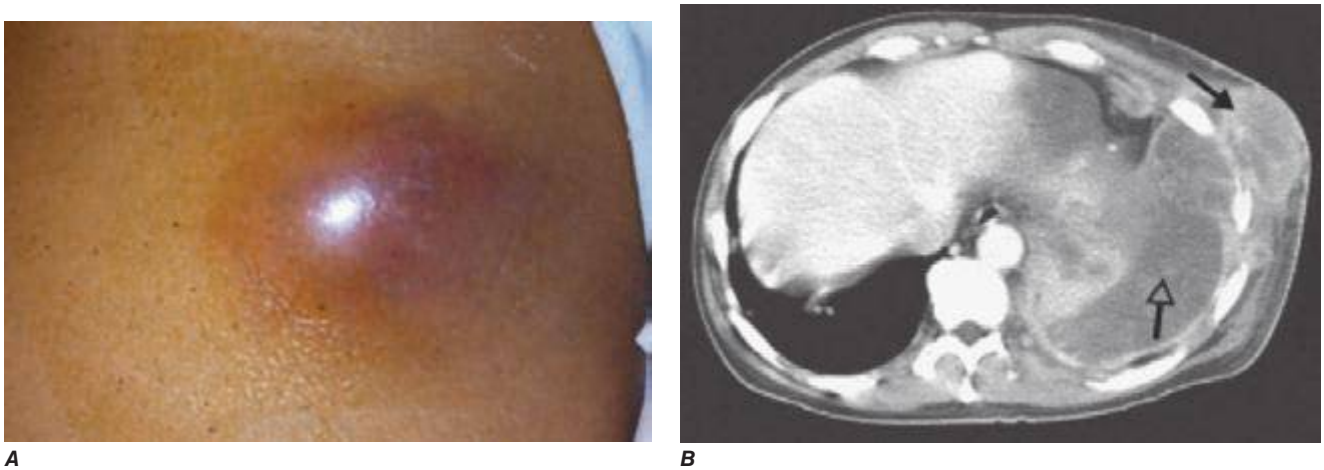
All levels of the urogenital tract can be infected. Renal disease usually presents as pyelonephritis and/or renal and perinephric abscess. Bladder involvement, usually due to extension of pelvic disease, may result in ureteral obstruction or fistulas to bowel, skin, or uterus. *Actinomyces* can be detected in urine with appropriate stains and cultures.

Pelvic Disease Actinomycotic involvement of the pelvis occurs most commonly in association with an IUCD. When an IUCD is in place or has recently been removed, pelvic symptoms should prompt consideration of actinomycosis. The risk, although not quantified, appears small. The disease rarely develops when the IUCD has been in place for <1 year, but the risk increases with time. Actinomycosis can also present months after IUCD removal. Symptoms are typically indolent; fever, weight loss, abdominal pain, and abnormal vaginal bleeding or discharge are the most common. The earliest stage of disease—often endometritis—commonly progresses to pelvic masses or a tuboovarian abscess (Fig. 200-4). Unfortunately, because the diagnosis is often delayed, a "frozen pelvis" mimicking malignancy or endometriosis can develop by the time of recognition. Ca125 levels may be elevated, further contributing to misdiagnosis.

Actinomyces-like organisms (ALOs), which are identified in Papanicolaou-stained specimens in (on average) 7% of women using an IUCD, have a low positive predictive value for diagnosis. Nonetheless, although the risk appears small, the consequences of infection are significant. Therefore, until more quantitative data become available, it seems prudent to remove the IUCD in the presence of symptoms that cannot be accounted for, regardless of whether ALOs are detected, and—if advanced disease is excluded—to initiate a 14-day course of empirical treatment for possible early endometritis. The detection of ALOs in the asymptomatic patient warrants education and close follow-up but not removal of the IUCD unless a suitable contraceptive alternative is agreed on.

Central Nervous System Disease Actinomycosis of the central nervous system (CNS) is rare. Single or multiple brain abscesses are most common. An abscess usually appears on CT as a ring-enhancing lesion with a thick wall that may be irregular or nodular. Magnetic resonance perfusion and spectroscopy findings have also been described, as have primary meningitis, epidural or subdural space infection, and cavernous sinus syndrome.

Musculoskeletal and Soft Tissue Infection Actinomycotic infection of bone and joints is usually due to adjacent soft-tissue infection but may be associated with trauma (e.g., fracture of the mandible), injections,



A ***B***

FIGURE 200-2 Thoracic actinomycosis. *A.* A chest wall mass from extension of pulmonary infection. ***B.*** Pulmonary infection is complicated by empyema (*open arrow*) and extension to the chest wall (*closed arrow*). *(Courtesy of Dr. C. B. Hsiao, Division of Infectious Diseases, Department of Medicine, State University of New York at Buffalo.)*