

AIDS-Associated Kaposi Sarcoma

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The most recent data from the Centers for Disease Control and Prevention (CDC) suggest there were approximately 30 635 individuals diagnosed with HIV in the United States in 2020, contributing to approximately 1.1 million Americans living with HIV.^{1,2} From 2016 to 2019, there was an 8% decrease in new cases in the United States and dependent areas.¹ Of those new HIV diagnoses, 68% were among gay and bisexual men, 22% were heterosexual individuals, and 7% included injection drug users.² The number of new HIV cases in 2020 was highest for Black and African American men who engaged in male-to-male sexual contact and individuals between the ages of 25 to 34 years.^{2,3}

HIV attacks and weakens the body's immune system and can gradually lead to AIDS.⁴ Individuals with HIV are susceptible to various infections as well as cancer development because of their weakened immune systems.⁴ Kaposi sarcoma (KS), also called *soft tissue sarcoma*, is the most common type of cancer related to HIV infection.^{4,5} KS tends to be the first indication that an HIV-infected individual has AIDS and often is discovered in the lining of the mouth during a dental examination.⁴ AIDS-associated KS, also known as *epidemic KS*, is 1 of 4 types of KS and is characterized by purplish or brownish lesions on the skin, in the mouth, or in internal organs (eg, lymph nodes, stomach and intestines, lungs and lining of the chest, liver, spleen).^{4,5} As with many cancers, imaging studies often are used to diagnose epidemic KS and detect any metastases among

individuals infected with HIV or AIDS. In addition, prevention is key to decreasing the number of individuals diagnosed with epidemic KS in the United States.

Diagnosis

If epidemic KS is suspected, a physician will obtain a complete history and physical examination, detailing the patient's sexual experience and activity and performing an examination of the skin and inside of the mouth to detect lesions.⁶ A biopsy might be needed to confirm the presence of epidemic KS.⁶ If KS is suspected in the lungs or lining of the chest, a chest radiograph might be ordered; if the chest radiograph is abnormal, a computed tomography (CT) scan of the chest is necessary to diagnose KS.⁶ In addition to characterizing abnormalities identified on a chest radiograph, other indications for a chest CT scan include⁷:

- assessing complications
- evaluating the mediastinum
- guiding interventional procedures
- staging of malignancy

Positron emission tomography-computed tomography (PET-CT) often is used to detect areas of increased uptake of fluorodeoxyglucose to confirm the presence of lesions or metastases.⁸ Bronchoscopy can be performed when the patient is experiencing shortness of breath or coughing up blood, common symptoms of epidemic KS in the lungs, and gastrointestinal endoscopy is used to detect KS in the stomach or intestines.⁶ Abdominal and pelvic CT and abdominal sonography

can be used to detect the presence of lesions in the stomach, small and large intestines, liver, and spleen.⁹ Because of its attention to soft tissue detail and characterization, magnetic resonance (MR) imaging also is commonly used to diagnose KS.¹⁰

Imaging Manifestations

Restrepo and Ocazonez stated oral and craniofacial involvement are common with epidemic KS, and often patients present with dysphagia.¹¹ Wakoh et al emphasized that the hard palate and gingiva (gums) are affected most frequently by epidemic KS and documented the importance of medical imaging in combination with a dental examination to confirm a diagnosis of KS.⁸ Researchers presented a case study involving a 41-year-old male who was infected with HIV and presented with swelling at the roof of his mouth for approximately 3 months.⁸ Their initial dental examination revealed increased bone exposure with osteonecrosis and ulcers in the anterior aspect of the hard palate and gingiva.⁸ CT results showed severe bone resorption, particularly around the right molar and incisor regions, and MR findings suggested bilateral mass-like lesions in the anterior submucosa of the hard palate.⁸ A second CT scan with contrast along with sonography revealed abnormal swelling in multiple cervical lymph nodes, including the submandibular lymph node.⁸ PET-CT demonstrated a strong uptake in the hard palate, and a whole-body PET-CT scan showed reactive uptake in both lungs and mediastinum.⁸ Because of multiple lesions in the mouth and lungs, lymphedema, anemia, and weight loss, a diagnosis of epidemic KS was made, and the patient was treated using antiretroviral therapy and chemotherapy.⁸

Moreover, Restrepo and Ocazonez acknowledged that thoracic involvement with epidemic KS is common.¹¹ On a chest radiograph, a diagnosis of epidemic KS often is made when bilateral, perihilar infiltrates are present in the lower lobes of the lungs in conjunction with the patient's history and physical examination.⁷ Large pleural effusions, unilateral or bilateral, also are common with epidemic KS and might be characteristically hemorrhagic on aspiration.⁷ Evidence of epidemic KS on a chest CT scan is described as flame-shaped nodules or masses along with thickened bronchovascular

bundles and interlobular septal thickening.⁷ Sims et al documented that diffuse mucosal thickening of the trachea as well as chest wall thickening are common with epidemic KS and often lead to respiratory compromise and poorer patient outcomes (see **Figure 1**).¹²



Figure 1. Epidemic Kaposi sarcoma (KS) in the posterolateral trachea. Axial computed tomography image demonstrating mucosal thickening with an enhancing lesion of the posterolateral trachea (blue arrow) and overlying chest wall skin thickening (white arrow) in a patient with KS. Reprinted under the Creative Commons Attribution 4.0 International License. Sims SEG, Li F, Lostracco T, et al. Multidimensional evaluation of tracheobronchial disease in adults. *Insights Imaging*. 2016;7:431-448. doi:10.1007/s13244-016-0489-2. creativecommons.org/licenses/by/4.0/

Restrepo and Ocazonez also indicated that gastrointestinal compromise is common among individuals diagnosed with epidemic KS.¹¹ They stated involvement with the upper tract, especially the stomach and duodenum, is more common than with the lower tract.¹¹ For some individuals infected with HIV, compromise of the gastrointestinal system might not be apparent, but for others, they can experience hemorrhage, perforation, intussusception, or obstruction.¹¹ If the appendix is affected, a patient might present with acute appendicitis.¹¹ Barium studies with double contrast can demonstrate submucosal and polypoid lesions of varying size, and lesions in the gastrointestinal tract and associated lymph node involvement will be enhanced on CT scans with contrast.¹¹

The appendicular and axial skeleton might be affected with epidemic KS, but the sternum, spine, ribs, and skull are more commonly involved.¹¹ Hughes et al discussed how soft tissue masses of the foot and ankle are infrequent but encouraged the use of MR to detect and diagnose these rare benign and malignant

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tumors.¹⁰ Researchers stated that KS, regardless of the type, appears as an exophytic (abnormal growth extending from the surface of tissue) and pedunculated (elongated) lesion, low signal on the T1-weighted image and high signal on the T2-weighted image with avid enhancement and a nodular proliferation of the dermis (see **Figure 2**).¹⁰ Blum et al mentioned that lytic (hollow) bone lesions are present in most epidemic KS cases that affect the hand (see **Figure 3**).¹³ Researchers used MR to detect epidemic KS in a 40-year old male's radius, scaphoid, and trapezoid bones.¹³

Prevention

To prevent being diagnosed with epidemic KS, individuals should avoid becoming infected with HIV.¹⁴ HIV is the most important preventive measure.⁵ To prevent HIV infection, the American Cancer Society suggests¹⁴:

- avoiding unprotected sex with individuals infected with HIV
- stopping use of contaminated needles to inject recreational drugs (or stop injecting drugs)
- taking a daily pill that contains antiviral drugs (ie, preexposure prophylaxis)
- treating mothers and infants who are infected with HIV with anti-HIV drugs and avoiding breastfeeding
- using a condom during any sexual contact

The American Cancer Society also states that treating individuals who are infected with HIV with highly active antiretroviral therapy to strengthen their immune systems is important.¹⁴ Highly active antiretroviral therapy reduces an individual's risk of developing AIDS or epidemic KS.^{5,14} Ensuring individuals are treated with the right medication can reduce the number of epidemic KS cases in the United States.^{5,14} The CDC also recommends the use of antiretroviral therapy to decrease viral load to less than 200 copies of HIV per milliliter of blood; this low viral load allows the immune system to keep individuals with HIV healthy and to prevent HIV transmission.¹⁵

Conclusion

Epidemic KS most commonly affects mucocutaneous sites, but it can invade lymph nodes and visceral

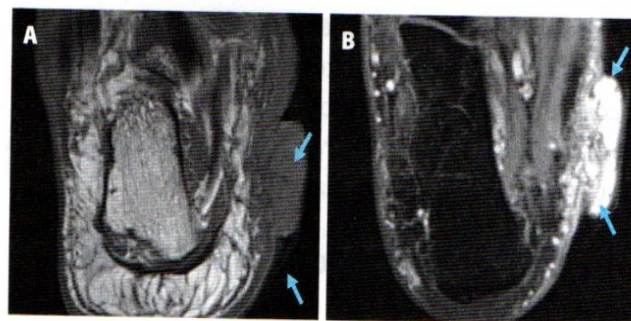


Figure 2. Epidemic KS on magnetic resonance (MR) images of the foot. Coronal T1-weighted (A) and postcontrast T1-weighted fat-saturated (B) images of the foot showing an exophytic lesion (abnormal growth extending from the surface of tissue), low signal on T1-weighted image with avid enhancement and a nodular proliferation of the dermis (arrows). Reprinted under the Creative Commons Attribution 4.0 International License. Hughes P, Miranda R, Doyle AJ. MRI imaging of soft tissue tumours of the foot and ankle. *Insights Imaging*. 2019;10(60). doi:10.1186/s13244-019-0749-z. creativecommons.org/licenses/by/4.0/

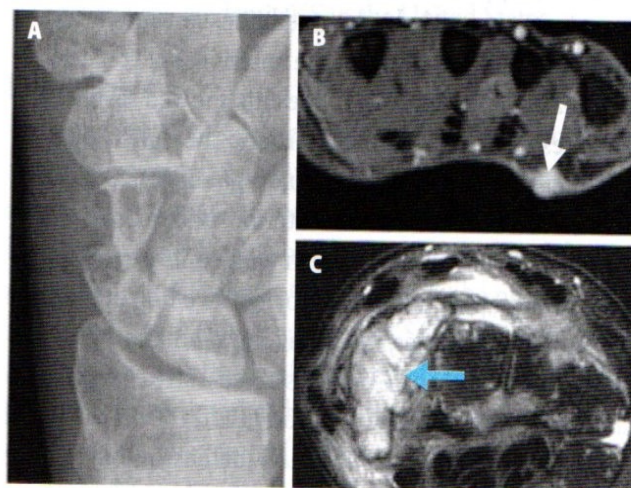


Figure 3. Epidemic KS on radiography and MR images. Epidemic KS in a 40-year-old man. A. Standard radiography showing bone lytic (hollow) tumors of the radius, scaphoid, and trapezoid bones. B and C. Axial T2-weighted MR images showing a small cutaneous tumor of the palm (white arrow), a tumor invading the scaphoid bone (blue arrow), and soft tissue infiltration. Reprinted under the Creative Commons Attribution 4.0 International License. Blum AG, Gillet R, Athlani L, et al. CT angiography and MRI of hand vascular lesions: technical considerations and spectrum of imaging findings. *Insights Imaging*. 2021;12(16). doi:10.1186/s13244-020-00958-4. creativecommons.org/licenses/by/4.0/

organs, mostly in the respiratory and gastrointestinal tracts.^{4,5,11} Medical imaging often is used to diagnose epidemic KS and detect any metastases among

individuals infected with HIV or AIDS. Individuals with HIV or AIDS should minimize their risk of epidemic KS by maintaining a healthy immune system, including treatment with highly active antiretroviral therapy.^{5,14}

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