

**1032** from primary sites of infection. hvKP infection initially was characterized and distinguished from traditional infections due to cKP by (1) presentation as community-acquired pyogenic liver abscess (**Fig. 186-1, top**), (2) occurrence in patients lacking a history of hepatobiliary disease, and (3) a propensity for metastatic spread to distant sites (e.g., eyes, central nervous system, lungs), which occurred in 11–80% of cases. More recently, this variant has been recognized as the cause of a variety of serious community-acquired extrahepatic abscesses/infections in the absence of liver involvement, including pneumonia, meningitis, endophthalmitis (**Fig. 186-1, middle**), splenic abscess, and necrotizing fasciitis. The affected individuals often have diabetes mellitus and are of Asian ethnicity; however, nondiabetics and all ethnic groups can be affected. Survivors often suffer catastrophic morbidity, such as loss of vision and neurologic sequelae.

*K. pneumoniae* subspecies *rhinoscleromatis* is the causative agent of rhinoscleroma, a granulomatous mucosal upper respiratory infection that progresses slowly (over months or years) and causes necrosis and occasionally obstruction of the nasal passages. *K. pneumoniae* subspecies *ozaenae* has been implicated as a cause of chronic atrophic rhinitis and rarely of invasive disease in compromised hosts. These two *K. pneumoniae* subspecies are usually isolated from patients in tropical climates and are genomically distinct from both cKP and hvKP.

### INFECTIOUS SYNDROMES



**Pneumonia** Although cKP accounts for only a small proportion of cases of community-acquired pneumonia in Western countries (**Chap. 153**), cKP and *K. oxytoca* are common causes of pneumonia among LTCF residents and hospitalized patients because of increased rates of oropharyngeal colonization. Mechanical ventilation is an important risk factor. In Asia and South Africa, community-acquired pneumonia due to hvKP is becoming increasingly common and often occurs in younger patients with no underlying disease. *Klebsiella* is also a common cause of pneumonia in severely malnourished children in developing countries.

As in all pneumonias due to enteric GNB, production of purulent sputum and evidence of airspace disease are typical. Presentation with earlier, less extensive infection is now more common than that with the classically described lobar infiltrate and bulging fissure. Pulmonary infection due to hvKP that has spread metastatically (e.g., from a hepatic abscess) usually includes nodular bilateral densities, more commonly in the lower lobes. Pulmonary necrosis, pleural effusion, and empyema can occur with disease progression.

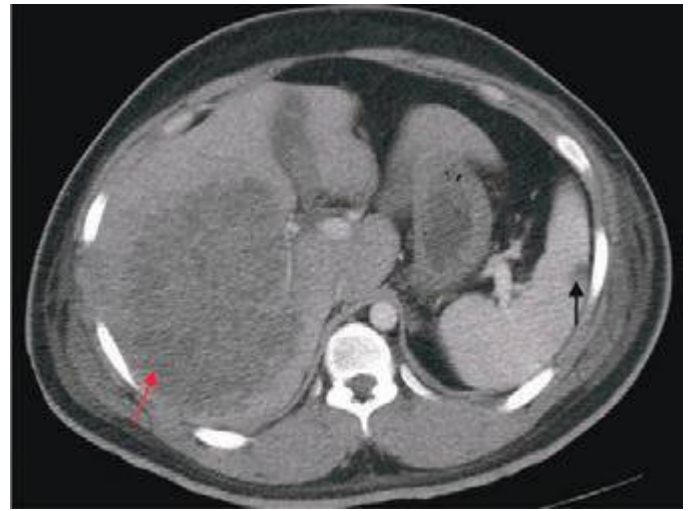
**UTI** cKP accounts for only 1–2% of UTI episodes among otherwise healthy adults but for 5–17% of episodes of complicated UTI, including infections associated with indwelling urinary catheters. UTI due to hvKP presents more commonly as renal or prostatic abscess due to bacteremic spread than as ascending infection.



**Abdominal Infection** cKP causes a spectrum of abdominal infections similar to that caused by *E. coli* but is less frequently isolated from these infections. hvKP is a common cause of monomicrobial community-acquired pyogenic liver abscess and in the Asian Pacific Rim has been recovered with steadily increasing frequency over the past two decades, replacing *E. coli* as the most common pathogen causing this syndrome. hvKP is increasingly described as a cause of spontaneous bacterial peritonitis and splenic abscess.



**Other Infections** cKP- and *K. oxytoca*-mediated cellulitis or soft tissue infection most frequently affects devitalized tissue (e.g., decubitus and diabetic ulcers, burn sites) and immunocompromised hosts. cKP and *K. oxytoca* cause some cases of surgical site infection and nosocomial sinusitis in addition to occasional cases of osteomyelitis contiguous to soft tissue infection, nontropical myositis, and meningitis (both during the neonatal period and after neurosurgery). By contrast, hvKP has become an important cause of community-acquired



**FIGURE 186-1** New hypervirulent variant of *K. pneumoniae* (hvKP).

**Top:** Abdominal CT scan of a previously healthy 24-year-old Vietnamese man shows a primary liver abscess (red arrow) with metastatic spread to the spleen (black arrow). (Courtesy of Drs. Chiu-Bin Hsaio and Diana Pomakova.) **Middle:** A previously healthy 33-year-old Chinese man presented with endophthalmitis. (From *Virulence* 4:2, 1-12 Feb. 15, 2013.) **Bottom:** A hypermucoviscous phenotype (which does not necessarily equate with a mucoid phenotype) has been associated with hvKP strains. This phenotype has been semiquantitatively defined by a positive “string test” (formation of a viscous string >5 mm long when bacterial colonies on an agar plate are stretched by an inoculation loop). (Courtesy of Dr. Russo.)