

present with a condition known as *Pott's puffy tumor*, with soft tissue swelling and pitting edema over the frontal bone from a communicating subperiosteal abscess. Life-threatening complications of sinusitis include meningitis, epidural abscess, and cerebral abscess.

Patients with acute fungal rhinosinusitis (such as mucormycosis; **Chap. 242**) often present with symptoms related to pressure effects, particularly when the infection has spread to the orbits and cavernous sinus. Signs such as orbital swelling and cellulitis, proptosis, ptosis, and decreased extraocular movement are common, as is retro- or periorbital pain. Nasopharyngeal ulcerations, epistaxis, and headaches are also common, and involvement of cranial nerves V and VII has been described in more advanced cases. Bony erosion may be evident on examination or endoscopy. Often the patient does not appear seriously ill despite the rapidly progressive nature of these infections.

Patients with acute nosocomial sinusitis are often critically ill and thus do not manifest the typical clinical features of sinus disease. This diagnosis should be suspected, however, when hospitalized patients with appropriate risk factors (e.g., nasotracheal intubation) develop fever without another apparent cause.

**Diagnosis** Distinguishing viral from bacterial rhinosinusitis in the ambulatory setting is usually difficult because of the relatively low sensitivity and specificity of the common clinical features. One clinical feature that has been used to help guide diagnostic and therapeutic decision-making is illness duration. Because acute bacterial sinusitis is uncommon in patients whose symptoms have lasted <10 days, expert panels now recommend reserving this diagnosis for patients with “persistent” symptoms (i.e., symptoms lasting >10 days in adults or >10–14 days in children) accompanied by the three cardinal signs of purulent nasal discharge, nasal obstruction, and facial pain (**Table 44-1**). Even among patients who meet these criteria, only 40–50% have true bacterial sinusitis. The use of CT or sinus radiography is not recommended for acute disease, particularly early in the course of illness (i.e., at <10 days) in light of the high prevalence of similar findings among patients with acute viral rhinosinusitis. In the evaluation of persistent, recurrent, or chronic sinusitis, CT of the sinuses becomes the radiographic study of choice.

The clinical history and/or setting often can identify cases of acute anaerobic bacterial sinusitis, acute fungal sinusitis, or sinusitis from noninfectious causes (e.g., allergic rhinosinusitis). In the case of an immunocompromised patient with acute fungal sinus infection,

immediate examination by an otolaryngologist is required. Biopsy specimens from involved areas should be examined by a pathologist for evidence of fungal hyphal elements and tissue invasion. Cases of suspected acute nosocomial sinusitis should be confirmed by sinus CT. Because therapy should target the offending organism, a sinus aspirate for culture and susceptibility testing should be obtained, whenever possible, before the initiation of antimicrobial therapy.

## TREATMENT ACUTE RHINOSINUSITIS

Most patients with a clinical diagnosis of acute rhinosinusitis improve without antibiotic therapy. The preferred initial approach in patients with mild to moderate symptoms of short duration is therapy aimed at symptom relief and facilitation of sinus drainage, such as with oral and topical decongestants, nasal saline lavage, and—at least in patients with a history of chronic sinusitis or allergies—nasal glucocorticoids. Newer studies have cast doubt on the role of antibiotics and nasal glucocorticoids in acute rhinosinusitis. In one notable double-blind, randomized, placebo-controlled trial, neither antibiotics nor topical glucocorticoids had a significant impact on cure in the study population of patients, the majority of whom had had symptoms for <7 days. Similarly, another high-profile randomized trial comparing antibiotics to placebo in patients with acute rhinosinusitis demonstrated no significant improvement in symptoms by the third day of therapy. Still, antibiotic therapy can be considered for adult patients whose condition does not improve after 10 days, and patients with more severe symptoms (regardless of duration) should be treated with antibiotics (**Table 44-1**). However, watchful waiting remains a viable option in many cases.

Empirical antibiotic therapy for adults with community-acquired sinusitis should consist of the narrowest-spectrum agent active against the most common bacterial pathogens, including *S. pneumoniae* and *H. influenzae*—e.g., amoxicillin or amoxicillin/clavulanate (with the decision guided by local rates of  $\beta$ -lactamase-producing *H. influenzae*). No clinical trials support the use of broader-spectrum agents for routine cases of bacterial sinusitis, even in the current era of drug-resistant *S. pneumoniae*. For those patients who do not respond to initial antimicrobial therapy, sinus aspiration and/or lavage by an otolaryngologist should be considered. Antibiotic prophylaxis to prevent episodes of recurrent acute bacterial sinusitis is not recommended.

Surgical intervention and IV antibiotic administration usually are reserved for patients with severe disease or those with intracranial complications such as abscess and orbital involvement. Immunocompromised patients with acute invasive fungal sinusitis usually require extensive surgical debridement and treatment with IV antifungal agents active against fungal hyphal forms, such as amphotericin B. Specific therapy should be individualized according to the fungal species and its susceptibilities as well as the individual patient's characteristics.

Treatment of nosocomial sinusitis should begin with broad-spectrum antibiotics to cover common and often resistant pathogens such as *S. aureus* and gram-negative bacilli. Therapy then should be tailored to the results of culture and susceptibility testing of sinus aspirates.

## CHRONIC SINUSITIS

Chronic sinusitis is characterized by symptoms of sinus inflammation lasting >12 weeks. This illness is most commonly associated with either bacteria or fungi, and clinical cure in most cases is very difficult. Many patients have undergone treatment with repeated courses of antibacterial agents and multiple sinus surgeries, increasing their risk of colonization with antibiotic-resistant pathogens and of surgical complications. These patients often have high rates of morbidity, sometimes over many years.

In *chronic bacterial sinusitis*, infection is thought to be due to the impairment of mucociliary clearance from repeated infections rather than to persistent bacterial infection. The pathogenesis of this

**TABLE 44-1** GUIDELINES FOR THE DIAGNOSIS AND TREATMENT OF ACUTE SINUSITIS IN ADULTS

Diagnostic Criteria	Treatment Recommendations <sup>a</sup>
Moderate symptoms (e.g., nasal purulence/congestion or cough) for >10 d or	<i>Initial therapy:</i> Amoxicillin, 500 mg PO tid; or Amoxicillin/clavulanate, 500/125 mg PO tid or 875/125 mg PO bid <sup>b</sup>
Severe symptoms of any duration, including unilateral/focal facial swelling or tooth pain	<i>Penicillin allergy:</i> Doxycycline, 100 mg PO bid; or Clindamycin, 300 mg PO tid  <i>Exposure to antibiotics within 30 d or &gt;30% prevalence of penicillin-resistant Streptococcus pneumoniae:</i> Amoxicillin/clavulanate (extended release), 2000/125 mg PO bid; or An antipneumococcal fluoroquinolone (e.g., moxifloxacin, 400 mg PO daily)  <i>Recent treatment failure:</i> Amoxicillin/clavulanate (extended release), 2000 mg PO bid; or An antipneumococcal fluoroquinolone (e.g., moxifloxacin, 400 mg PO daily)

<sup>a</sup>The duration of therapy is generally 7–10 days (with consideration of a 5-day course), with appropriate follow-up. Severe disease may warrant IV antibiotics and consideration of hospital admission. <sup>b</sup>Although the evidence is not as strong, amoxicillin/clavulanate may be considered for initial use, particularly if local rates of penicillin resistance or  $\beta$ -lactamase production are high.