

Multiple-resistant cutaneous staphylococci - extension of diagnostics of patients with chronic sinusitis to include genetic tests

Michalik M, Gerwel A, Samet A, Podbielska-Kubera A

MML Medical Center, Poland

Abstract

Bacterial infections are responsible for 60–90% of all sinusitis cases. One of the more common bacteria in patients with chronic sinusitis are coagulase negative staphylococci (CoNS). CoNS are a heterogeneous group of bacteria that colonize the skin and mucous membranes of humans and animals. CoNS are typical saprophytes but become pathogens under certain conditions. Thus, coagulase-negative staphylococci contribute to the occurrence of infection in various locations, symptoms and course. CoNS are widespread in ENT, especially in patients with chronic sinusitis. Known in the past as “cutaneous staphylococci,” CoNS have been interpreted as companion bacteria or contamination of diagnostic samples. Today, based on reports from advanced microbiological laboratories using molecular diagnostic methods, it is known that CoNS are dangerous pathogens responsible for infections, including nosocomial infections. In clinical practice, there is a significant patient population with chronic sinusitis who remain refractory to treatment despite its stringent regimens, including surgery and prolonged antibiotic therapy. Antibiotic-resistant and difficult to eradicate bacteria are the most common bacteria in these patients. Standard therapy based on the sensitivity of microorganisms is not sufficient in such cases. In addition to determining the mechanisms of antibiotic resistance, the properties of microorganisms are also important, including the ability to form biofilms and the presence of microbial virulence (pathogenicity) factors. Performing an extended antibiogram and accurately determining the minimum inhibitory concentration (MIC) of an antibiotic and linking phenotypic antibiotic resistance with the presence and expression of antibiotic resistance genes in specific bacterial strains will contribute to understanding the mechanisms of the emergence and maintenance of antibiotic resistance. Such analysis is particularly important in patients susceptible to infections, it will allow for more targeted therapy in patients, and will also allow to track the transmission of antibiotic-resistant strains, which in the long run will contribute to lowering antibiotic resistance among bacteria. The information obtained in the course of genetic tests in conjunction with the results of other clinical trials and the interview obtained from the patient will allow for personalized, targeted treatment.

Introduction:

Several microorganisms, including bacteria, archaea, fungi, and viruses, have been detected and isolated from healthy human tissues and biofluids. “Microbiota” is a scientific term that refers to any non-pathogenic microbes that have the ability to survive and colonize some human parts such as nose, mouth, and skin. The human nasal cavity is a section of the respiratory system and all the parts of the respiratory system receive the inhaled air through the nasal cavity. Evidence indicates that the normal microorganisms of the nasal cavity maintain the health of the respiratory tract and functions of the defense system reported that the nasal cavity of a healthy adult is colonized by several opportunistic bacteria such as *Corynebacterium* spp., *Aureobacterium* spp., *Rhodococcus* spp., and *Staphylococcus* spp. Numerous species of fungi have also been isolated from the healthy nasal cavity. For instance, Sellart-Altisent et al. reported that *Alternaria* spp., *Penicillium* spp., *Aspergillus* spp., and *Cladosporium* may colonize the nasal cavity of healthy humans. There are several invasive and allergic fungi have been diagnosed in nasal cavity.

Lina et al. confirmed that the microbiota have the ability to colonize the healthy human nasal cavity and live under constant competition conditions. Commensal microbes could prevent the colonization of the human nasal cavity by pathogenic bacteria. For instance, *Staphylococcus epidermidis* strains known to produce serine protease have the ability to block biofilm formation by pathogenic *S. aureus*.

S. aureus is one of the most pathogenic bacteria associated with human and animal diseases. The growing number of infections caused by *S. aureus* resistant to antibiotics has become a complex health problem. The pathogenesis and epidemiology of *S. aureus* infection are significantly associated with *S. aureus* that colonized the normal nasal carriage determined as a hazard factor for hospital- and community-acquired bacterial summarized the bio-factors that control *S. aureus* nasal carriage These factors included bacterial adherence compounds, the upper respiratory system infections, nasal abnormalities, histocompatibility antigen types, microbiota of nasal cavity, host age, genetic and immunity factors, repeated needle injections, hormonal situation in women, and hospitalization.

Conclusion:

URTIs of viral origin should run their course, with gradual improvement in symptoms daily until complete resolution of symptoms occurs by day 7 to 10, with supportive treatment only and no antibiotics.

When a secondary bacterial infection is suspected and antibiotics are given for acute sinusitis, the expected clinical outcome would be resolution of the infection and associated symptoms. This was shown in a study by Wald, in which symptoms resolved in 79% of patients who had clinically and radiographically diagnosed sinusitis and who had been treated with amoxicillin or amoxicillin plus clavulanic acid.

The data on outcomes of medical management of chronic sinusitis are showing that we can control symptoms to a degree, although with a high rate of recurrence. Hamilos reported a retrospective series of patients treated medically for chronic sinusitis. Treatment included systemic steroids for 10 days, antibiotic coverage for aerobic and anaerobic organisms for 4 to 6 weeks, nasal saline irrigation, and topical steroid nasal spray. There were symptomatic and radiographic improvements in 17 of 19 patients, but 8 of 19 had persistent ostiomeatal complex abnormalities. In addition, relapse of sinusitis has been significantly associated with nasal polyposis and a history of prior sinus surgery.

Overall, we have many treatment options for the sinusitis patient: antibiotics for the bacterial infection; steroids, systemic or topical, for the inflammatory component; and surgery for the anatomic and structural abnormalities that can predispose to sinusitis. Although these have helped with initial improvement, we still see a high rate of recurrence of sinus disease. This forces us to address the role of comorbid conditions such as allergic rhinitis, environmental irritants, or the need for newer and better treatment modalities for this disease.