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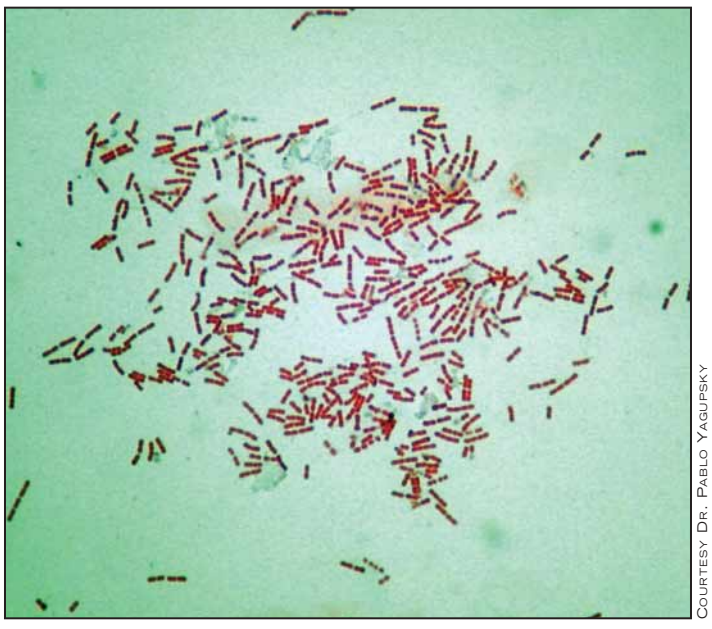
ID CONSULT

Kingella kingae Emerging

Skeletal infection has always been among the top five reasons for inpatient pediatric infectious disease consultations in our institution. Early diagnosis, prompt surgical drainage, and appropriate antimicrobial therapy remain the keys to good outcome. While the clinical manifestations of these infections haven't changed over the years, the microbiologic etiologies have, and this has impacted therapeutic decision making.

Staphylococcal infection remains the most common cause of skeletal infection overall. In recent years, as methicillin-resistant *Staphylococcus aureus* (MRSA) has emerged, clindamycin has become a common empiric antimicrobial choice for such cases. However, this may not be a good choice for therapy for some children with skeletal infection.

Once considered an unusual cause of pediatric infection, *Kingella kingae* has emerged as potentially the No. 1 cause of septic arthritis in the child younger than 24 months of age. This fastidious organism, which is often resistant to clindamycin, colonizes the oropharynx of approximately 15% of healthy toddler children. The problem is, it is difficult to grow on culture, requiring an enhanced isolation methodology and a little longer than normal (4.4 days) to grow. Knowing when to think about *K. kingae* as a potential pathogen should help you provide successful treatment for such children.



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An example of a typical Gram stain of organisms from a *Kingella kingae* colony is shown.

Consider the typical case in which a previously healthy and fully immunized child toddler with a recent upper respiratory infection (URI) presents in your office with a high spiking fever and irritability. History reveals no ill contacts, pets, or travel, and you cannot localize a focus for fever or fussiness on examination.

The next day, the child is limping. At this point, further evaluation is warranted and you consider the diagnosis of septic arthritis, keeping in mind that it is a medical and surgical emergency. In the febrile limping toddler with presumed septic arthritis, immediate evaluation by an orthopedic surgeon is necessary. Joint drainage is promptly performed.

What tip-offs might suggest to you that *K. kingae* should be considered as a potential pathogen, and how might this impact your therapeutic decision making?

Kingella kingae has emerged as potentially the No. 1 cause of septic arthritis in the child younger than 24 months of age.

For the most part, this organism is an important cause of skeletal infection only in those less than 2 years of age. Other information that may be helpful includes the fact that concomitant URI or stomatitis occurs frequently in such patients (over half in one study), suggesting a respiratory or buccal source for the infection. And this organism has a predilection for ankle involvement in cases of arthritis and calcaneal involvement in bone infection.

Keeping this in mind, since *K. kingae* is extremely hard to grow on culture, you should alert your surgeon and microbiology laboratory. In addition to routine cultures, ask your orthopedic surgeon to place some of the purulent fluid into a blood culture bottle, in addition to plating for routine culture. Over a decade ago, physicians were alerted to the importance of using BACTEC blood culture bottles to isolate *K. kingae* in toddlers with skeletal infection (J. Clin. Microbiol.1992;30:1278-81).

The investigators analyzed culture records for the 1988-1991 period and compared the performance of routine culture versus use of blood culture bottle for the recovery of pathogens. A diagnostic joint tap was performed in 216 children. Of those, 63 specimens grew significant organisms. Both methods were comparable for recovery of usual pathogens, but *K. kingae* isolates were detected by the BACTEC system *only,* in 13 of 14 specimens.

Just how often *K. kingae* is the culprit in infant septic arthritis is not completely clear since many centers have not routinely used the above technique to enhance growth.

In a study conducted in Atlanta between 1990 and 1995, where joint aspirates were inoculated into thioglycolate broth, rather than blood culture, gram-positive bacteria were identified in 47 of 60 children (78%) younger than 3 years of age with culture-positive hematogenous septic arthritis and acute or subacute osteomyelitis, while gram-negative organisms were identified in 13 (22%). Of those, *K. kingae* was cultured in 10 (17%); all such cases occurred in children between the ages of 10.5 and 23.5 months. (J. Pediatr. Orthop. 1998;18:262-7).

Now comes information that implicates *K. kingae* in a cluster of skeletal infection in one day care center in Minnesota. Three cases occurred among children aged 17-21 months attending the same toddler classroom. Within the same week, all affected children had onset of fever, and antalgic gait. They all had preceding or concurrent upper respiratory illness. *K. kingae* was isolated from clinical specimens.

For physicians who have been practicing long enough to remember the *Haemophilus influenzae* type b era, this may seem familiar.

Before the Hib vaccine became widely used, *H. influenzae* type b was recognized as the etiologic agent in 80% of septic arthritis cases in children less than 2 years of age, and day care center outbreaks were notable.

A colonization study was performed in response to the Minnesota outbreak. Published in Pediatrics in August 2005, the investigators demonstrated that 13% of children at the index day care center (and 45% in the room where the cluster occurred) were colonized in the nasopharynx with *K. kingae*. Interestingly, no day care center staff or children less than 16 months old were colonized. They compared the nasopharyngeal colonization results with a control day care center. Similarly, 16% of toddler age children were colonized. (Pediatrics 2005;116:e206-13).

In the pre-Hib vaccine era, we routinely used to use rifampin to eradicate Hib carriage among children in day care. Rifampin was used to attempt decolonization of children in the outbreak but proved to be only moderately effective: three of nine children who took rifampin remained positive on reculture 10-14 days later.

As practitioners recognize the importance of recognizing *K. kingae* as a pathogen in the infant with skeletal infection (and others are noting the emergence of clindamycin-resistant MRSA), clinical decision making in cases of pediatric skeletal infection are becoming increasingly difficult.

A collaborative approach with you, your infectious disease specialist, and orthopedic surgeon that focuses on early diagnosis, pathogen isolation, prompt surgical drainage, and appropriate antimicrobial therapy should allow for the best outcomes. ■

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