Article

Antibiotic therapy of bone and joint infections in children: proposals of the French Pediatric Infectious Disease Group

Antibiothérapie des infections ostéo-articulaires en 2015 : propositions du Groupe de Pathologie Infectieuse Pédiatrique (GPIP)

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Summary

Acute hematogenous bone and joint infections (osteomyelitis, septic arthritis, osteoarthritis, and spondylodiscitis) affect more frequently children younger than 5 years of age. Early diagnosis and prompt treatment are needed to limit the risk of complications. Children with suspected bone and joint infections (BJI) should be hospitalized at the beginning of treatment. Surgical drainage is indicated in patients with septic arthritis and in those with periosteal abscess. *Staphylococcus aureus* is involved in BJIs in children at all ages; *Kingella kingae* is a very common causative pathogen in children under 4 years of age. The French Pediatric Infectious Disease Group recommends in children > 3 months of age empirical antibiotic therapy with appropriate coverage against methicillin-sensitive *S. aureus* with high doses (150 mg/kg/day) of intravenous amoxicillin-clavulanate, cefuroxime or cefazoline. In

Résumé

Les infections ostéo-articulaires (IOA) (arthrite septique, ostéomyélite, spondylodiscite) sont des infections aigües d'origine hématogène. Elles constituent une urgence diagnostique et thérapeutique car leur pronostic est lié à la rapidité de la prise en charge. Le traitement est débuté lors d'une hospitalisation initiale. Il comporte le drainage chirurgical des collections (arthrites septiques, abcès compliquant certaines ostéomyélites) et le début d'une antibiothérapie intraveineuse probabiliste ciblant, chez l'enfant âgé de plus de 3 mois, *S. aureus*, et *Kingella kingae* avant l'âge de 4 ans. En France, *S. aureus* est sensible à la méticilline (incidence <10 %). L'antibiothérapie de première intention recommandée par le Groupe de Pathologie Infectieuse Pédiatrique est l'amoxicilline-acide clavulanique le cefuroxime ou la céfazoline à la posologie de 150 mg/kg/j. Chez les enfants présentant des IOA non compliquées, le relais oral de l'antibiothérapie est effectué après 3 jours quand l'infection est contrôlée (disparition de la fièvre et des douleurs, baisse de la CRP). Si le germe n'est pas

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most children with uncomplicated BJI, short intravenous antibiotic therapy for 3 days can be followed by oral therapy. The minimum total duration of antibiotic therapy should be 10 days for septic arthritis and 3 weeks for osteomyelitis.
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isolé, le relais oral est effectué avec l'association amoxicilline-acide clavulanique à la posologie de 80 mg/kg/j. La durée totale minimale de l'antibiothérapie est de 10 jours pour les arthrites et de 3 semaines pour les ostéomyélites et la majorité du traitement s'effectue en ambulatoire.
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The main causes of acute hematogenous bone and joint infections (BJIs) are *S. aureus* (SA), in children of any age, and *K. kingae* in children less than 4 years of age. They can also be caused by Group A *Streptococcus* (GAS) and more rarely by *Streptococcus pneumoniae* or *Neisseria meningitidis*. Group B *Streptococcus* and *Escherichia coli* are responsible for BJIs occurring in newborns and young infants under 3 months of age. *Salmonella* spp is also implicated in cases occurring in sickle cell disease patients. The infection can affect the metaphysis of long bones near the growth cartilage (osteomyelitis), the joint cavity (septic arthritis), the vertebral body or the posterior arc of the vertebra (spondylodiscitis). In newborn and children less than 18 months of age, the growth cartilage of the large joints (hip, knee, shoulder, and elbow) remains vascular and disseminates the infection from the metaphysis toward the epiphysis, generating osteoarthritis. The initial risk is severe sepsis (SA or GAS) and later functional sequelae (femoral head necrosis, joint cartilage lesion, abnormal growth of long bones because of sterilization of the growth cartilage).

Loss of limb use is the main clinical sign, fever is most often present but there are subacute symptoms, with little or no fever, and the biological inflammatory syndrome may be moderate particularly for *K. kingae*.

These infections are medical and surgical emergencies. Treatment is always initiated during hospitalization. Purulent collections (intra-articular effusion, subperiosteal, intramedullary, or soft tissue abscess) are urgently drained under general anesthesia, and in all cases probabilistic pediatric orthopedic advices is counseled and antibiotics are started rapidly after having taken bacteriological samples (take at least two blood cultures close together) [1-5].

Over the past few years, studies have shown that it is possible to shorten the treatment [6]. In 2008, the French Pediatric Infectious Disease Group suggested simplifying and shortening antibiotic treatment of community-acquired childhood BJIs. Monotherapy is preferred, targeting the most frequently identified bacteria: *S. aureus* (sensitive to methicillin in France in > 90% of cases) and *K. kingae* (sensitive to amoxicillin and cephalosporins) [7,8]. Some BJIs are immediately very severe (initial septic shock, multifocal BJIs, association with fasciitis, myositis, septic thrombosis, or pneumonia) and should suggest *S. aureus* producing Panton Valentine leucocidin (PVL), requiring addition of an antitoxin antibiotic such as clindamycin [9,10].

With adapted treatment, the majority of these infections evolves rapidly toward a favorable outcome, allowing to secondary switch to oral antibiotic treatment on an outpatient basis. In case of unfavorable progression after 48–72 h of treatment (persistence of fever and pain), one should verify that the antibiotic treatment is optimal (antibiotics, dosages, number of administrations per 24 h), pursue IV antibiotic treatment, and search for a complication (abscess, arthritis, septic thrombophlebitis) using imagery (MRI, CT, ultrasound), guided by the clinical picture [7,8].

The following tables presents the different clinical situations, the pathogenic agents most often involved (targets of antibiotic treatment), the preferred treatments, as well as the alternatives in case of allergy.

Declaration of conflicts of interest

The authors declare that they have no conflict of interest with the article.

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