O056

2-hour Oral Session

Severe infections in children

Epidemiology and optimized decision algorithm for the diagnosis of paediatric community-acquired bone and joint infections: lesson learnt from 191 cases

A. Freydiere[1], G. Descours[1], N. Vernet[1], G. Maccio[1], S. Marion[1], A. Epercieux[2], Y. Benito[1], K. Abelin-Genevois[2], A. Fassier[2], B. Dohin[2], E. Piaton[3], F. Vandenesch[1], A. Carricajo[2], S. Boisset[4], F. Laurent[5]

[1]*Laboratoire de Bactériologie - Institut de Microbiologie - Centre de Biologie et de Pathologie Est - Hospices Civils de Lyon, Lyon, France*

[2]*Laboratoire de Bactériologie - CHU de Saint-Etienne, Saint-Etienne, France*

[3]*Laboratoire d'Anatomo-cyto-pathologie - Centre de Biologie et de Pathologie Est - Hospices Civils de Lyon- Bron, Lyon, France*

[4]*Laboratoire de Bactériologie - CHU de Grenoble, Grenoble, France*

[5]*Laboratoire de Bactériologie - Centre de Biologie et de Pathologie Nord - Hospices Civils de Lyon, Lyon, France*

Objectives: (i) to update epidemiological data on pediatric community-acquired bone and joint infections (BJI), (ii) to evaluate the performance of cultural and molecular diagnostic methods, (iii) to purpose a decision algorithm for optimizing the diagnosis of pediatric BJI.

Methods: This prospective study conducted by two French teaching hospitals (Lyon, Saint-Etienne) as part of a clinical research protocol included 191 children suspected for community-acquired BJI on the basis of medical history and clinical symptoms (lameness, local pain and fever).
For each child, an aspiration of joint fluid and a blood culture were performed. The joint fluid was partially inoculated into blood culture bottles directly in the operating room and then submitted to the bacteriological laboratory. Cytology, culture (direct agar plating and enrichment), universal 16S rRNA PCR and PCR targeted to *Staphylococcus* spp, *S. aureus*, *Streptococcus* spp, *S. pneumoniae*, *Kingella kingae*, *Borrelia burgdorferi* and *Propionibacterium acnes* were systematically performed on joint fluid.
A presumed BJI diagnosis was confirmed by the positivity of cytology and by a bacteriologic documentation and/or a recovery under antimicrobial therapy.

Results: A BJI was confirmed in 183 children (mean age: 4.6 years, median: 2.1 years, range: 6 months – 17 years). A diagnosis by culture and/or PCR was obtained in only 55.2% of cases (n=101). In 6% of cases (n=11), the clinicians considered positive bacteriological results as contaminating bacteria (skin or environmental bacteria or multimicrobial results by a unique diagnostic method).
The respective contributions of culture, inoculation into blood culture bottles, PCR assays and blood culture are shown in Table 1.
In children under 4 years (n=112), 64% of BJI were documented, with *Kingella kingae* that was the most prevalent pathogen (n=53, 74% of these cases). *Kingella kingae* PCR was the only method positive in all cases. *Streptococcus pneumoniae* was the second most common pathogen (n= 6).
In children over 4 years (n=71), 41% of BJI were documented. Among them, 59% were due to *S. aureus* (n=18), associated with a bacteraemia in 44% of cases (n=8).

Conclusion: On the basis of these results, we purpose the following diagnostic scheme:
(i) children under 4 years: a *K. kingae* specific PCR upon receipt of joint fluid at the laboratory; if negative, a *S. pneumoniae* specific PCR without waiting for culture results; then, a universal 16S rRNA PCR if culture remains negative after a 48-hour incubation;
(ii) children over 4 years: waiting for the 48-hour culture results; if negative, a 16S rRNA or a specific-PCR according to the clinical setting (for instance septic shock and *Streptococcus pyogenes*).
This algorithm is especially interesting for children under 4 years by shortening the delay of diagnosis and consequently the time for hospitalization and the time of intra venous and oral antibiotic treatment.

Tableau 1. Epidemiology, location and performance of cultural and PCR methods for diagnosing bone and joint infections (BJI) in Paediatrics units.

Pathogens	No. of documented BJI (among them, no. of joint fluids associating at least an additive contaminating bacteria)	Median age (range) (years)	Location			Performance of diagnostic methods					
						Joint fluid					Blood
						Culture		PCR			
			Lower limb	Upper limb	Other	Direct agar plating and enrichment	Blood culture bottles	16S rRNA PCR	Genus specific PCR (*Staphylococcus* or *Streptococcus*)	Species specific PCR	Blood culture bottles
Kingella kingae	54 (6)	1.4 (0-5)	36	15	3	5	24	34	-	54	0
Staphylococcus aureus	19 (3)	9.1 (0-16)	15	2	2	14	18	8	13	15	8
Streptococcus pyogenes	9 (1)	6.5 (0-8)	9	-	-	5	4	6	6	-	4
Streptococcus pneumoniae	7 (1)	0.8 (0-17)	6	1	-	3	5	3	3	4	2
Streptococcus milleri	3	8 (0.7-11)	2	1	-	3	2	3	3	-	0
Coagulase-negative *Staphylococci*	2	2.65 (2.6-2.7)	1	1	-	0	1	0	1	-	0
Streptococcus agalactiae	1	0.1	1	-	-	1	1	1	1	-	0
Salmonella enteritidis	1	1.4	-	1	-	1	1	1	-	-	0
Fusobacterium nucleatum	1	7.3	1	-	-	1	1	1	-	-	0
Mycoplasma pneumoniae	1	1.3	1	-	-	0	0	1	-	-	0
Enterobacter cloacae	1	7	1	-	-	1	1	1	-	-	0
Gemella haemolysans	1	1.5	1	-	-	0	0	1	-	-	0
Propionibacterium acnes	1	1	1	-	-	0	0	0	27	1	0
TOTAL (n=101)	101	2.1	75	21	5	34	58	50	0	74	14