The Microbiology of Septic Arthritis in Young Auckland Children

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Background

Septic arthritis in children can have permanent consequences[1]; hence timely microbiologic diagnosis and targeted antimicrobial management are important. *Kingella kingae*, a gram negative coccobacillus, has been described as an important cause of septic arthritis in young children[2-5]. Inoculation of synovial fluid in blood culture bottles and Polymerase Chain Reaction (PCR) improve the number of identified cases[3]. The prevalence of this pathogen in New Zealand (NZ), where there are very high rates of childhood osteoarticular infections due to *Staphylococcus aureus* and *Streptococcus pyogenes*[6], is not known.

Aim

1. To determine the microbiological profile of septic arthritis in children <5 years in NZ.
2. To describe the clinical features, investigations, surgical management and antimicrobial therapy of young children with septic arthritis at our institution.

Materials and Methods

- Retrospective review of children <5 years with septic arthritis at a tertiary children's hospital in Auckland, NZ, between 2005 and 2014.
- Septic arthritis cases identified by ICD-10 code M00 pyogenic arthritis, in addition to review of laboratory records of children who underwent sterile cavity joint aspirates.
- **Inclusion criteria:** fulfilment of joint aspirate criteria for a septic joint*, AND/OR objective findings of joint inflammation in addition to a blood culture result positive for a true pathogen.
- **Exclusion criteria:** multifocal sepsis, septic arthritis complicated by contiguous osteomyelitis, septic arthritis as a consequence of orthopaedic interventions, or penetrating injury to the joint.

***Septic joint aspirate criteria = Positive Gram stain of synovial fluid, AND/OR a WCC >50,000/mm3 or 'too high to count' AND/OR growth of true pathogen on culture .**

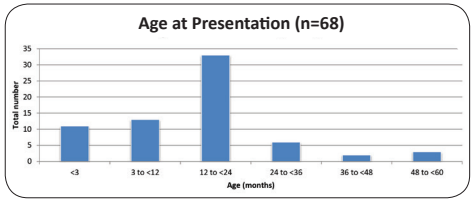
Laboratory Methods:

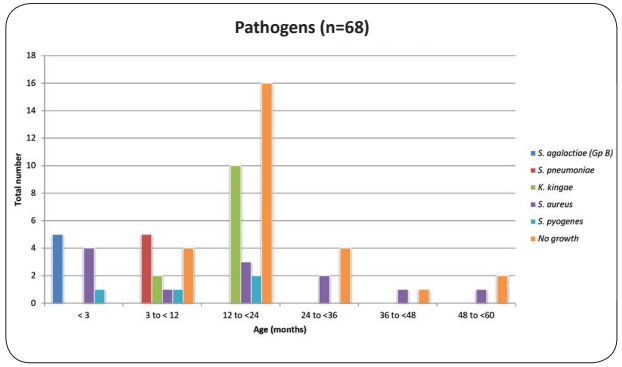
- Synovial fluid was directly inoculated into BD Bactec blood culture bottles, which were loaded into the BACTEC blood culture incubator (enrichment culture). The remaining specimen was centrifuged and used to inoculate Sheep blood, Brain-Heart Infusion and GC-Saponin agar.
- 6/67 underwent 16s ribosomal RNA (16srRNA) PCR testing.

Results

Demographics:

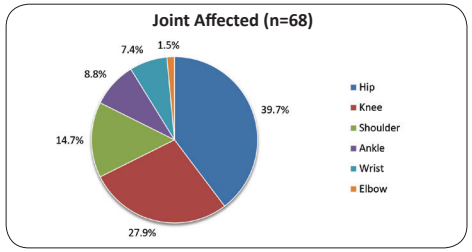
- 68 episodes of septic arthritis occurred in children <5 years of age.
- Median age 14.3 months (range 0.4 – 56.8 months); 57 (83.8%) were aged <24 months.
- 40 (58.8%) were male.

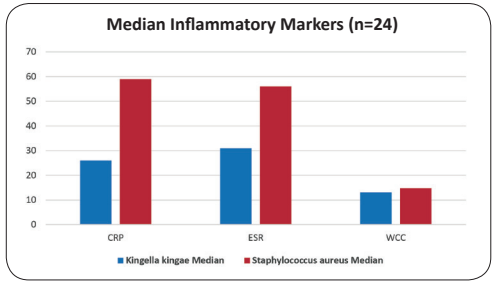




Joint Affected:

- The most common joint affected was hip in 27 (39.7%), followed by knee in 19 (27.9%).





Microbiology:

- Causative pathogen identified in 41/68 cases.
- All pathogens were identified by culture.

Specific Pathogens:

Kingella kingae (12 cases):

- 1 (8.3%) from blood culture and 11 (91.7%) from synovial fluid.
- 7 (63.6%) positive only on enrichment culture, and 1 (9.1%) detected only from synovial fluid inoculated into a blood culture bottle.
- All *Kingella kingae* isolates were susceptible to amoxicillin/ampicillin, and beta lactamase negative.

Staphylococcus aureus (12 cases):

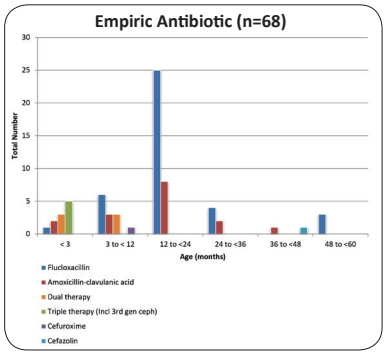
- 3/12 (25%) methicillin-resistant.
- Sub-group analysis of *Kingella kingae* vs. *Staphylococcus aureus* showed higher median inflammatory markers in those with *Staphylococcus aureus.*

Surgical Management:

- 66/68 (97.1%) underwent surgical joint washout, with a range of 1 – 5 washouts.
- 32 (47.1%) had 1 washout. (39.7%) had 2 washouts, and 7 (10.3%) had ≥3 washouts.

Antimicrobial therapy:

- Empiric antibiotic prescibing differed by age at presentation with younger age groups receiving more broad-spectrum cover.
- Flucloxacillin was most commonly prescribed.



Conclusions

- *Kingella kingae* is an important pathogen in paediatric septic arthritis in NZ, and the leading pathogen in children aged 12 to 24 months.
- The highest number of cases with no confirmed pathogen was in 12 - 24 month age group, raising the possibility of additional undetected Kingella kingae cases.
- All strains of *Kingella kingae* were amoxicillin/ampicillin sensitive.
- There was wide variation in empiric antibiotic choice, particularly in those under 24 months. Most received flucloxacillin monotherapy empirically.
- In toddlers, it is important to consider *Kingella kingae.* Initial antibiotic options include Cefazolin, Amoxicillin-Clavulanic Acid, or Amoxicillin+flucloxacillin

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