SHORT REPORT

Viridans streptococci causing community acquired pneumonia

M Freitas, A Castelo, G Petty, C E Gomes, E Carvalho

Arch Dis Child 2006;**91**:779–780. doi: 10.1136/adc.2006.094847

In children under 5 years of age, presenting to the paediatric emergency room with clinical and radiological findings of pneumonia, viridans streptococci were isolated in 10/33 positive haemocultures as the only microorganism. Viridans streptococci should therefore not be ruled out as a cause of pneumonia.

Community acquired pneumonia (CAP) is a frequent diagnosis in emergency rooms worldwide and particularly in the developing world, where 60–70% of cases are caused by bacteria.[1] *Streptococcus pneumoniae* is the most prevalent agent. However, the precise epidemiology of childhood pneumonia remains poorly defined because accurate and prompt aetiological diagnosis is limited by inadequate clinical, radiological, and laboratory diagnostic methods.[2]

Viridans streptococci (VS), bacteria usually found in the upper respiratory tract, are generally disregarded as the aetiological agent of pneumonia, even when isolated from cultures of sterile material such as pleural fluid or lung aspirate.[3]

The overuse of antibiotics may change the aetiological spectrum of CAP; non-pathogenic organisms, such as VS, have increased their virulence and caused infections such as pneumonia.[4] VS have been recovered from pleural effusions, highlighting the pathogenicity of these bacteria in mixed lower respiratory infections in children with CAP in the developed world.[2]

As there are no reports of VS as a cause of pneumonia in children under 5 years old in the developing world, the present study investigated its occurrence in Brazil.

METHODS

Following research ethics committee approval, children aged 3 months to 5 years of age, presenting to the paediatric emergency room of a university hospital or at two public secondary hospitals, were enrolled in a cross-sectional study. Children presented with an acute history of fever, cough, and respiratory distress (respiratory rate >50/minute); chest *x* ray showed pulmonary consolidation. Wheezing children and those who had received previous antimicrobial therapy were excluded. Eligible children had 5 ml of blood drawn for haemoculture. Collected samples were incubated at 37°C for 18–24 hours before shipping to the reference microbiology laboratory of the Division of Infectious Diseases of UNIFESP Medical School. The following procedures for isolating aerobic bacteria were routinely done: Gram staining, test for the presence of α-haemolysis, catalase reaction, and sodium chloride, optoquine, and esculine bile tests. Strains identified as non-pneumococci α-haemolytic streptococci were lyophilised and sent to the Centers for Disease Control (CDC), USA, for final identification.

Table 1 Microorganisms isolated from blood cultures

Bacteria	n	%
S pneumoniae	18	54.5
S viridans	10	30.3
Haemophilus sp.	2	6.1
S aureus	2	6.1
Kleibsiella sp.	1	3.0
Total	33	100

RESULTS

A total of 100 children fulfilling the inclusion criteria were included. Aerobic bacteria were isolated from 33; *S pneumoniae*, recovered from blood cultures, was identified in 18, followed by *S viridans* in 10 patients. Other isolated bacteria were *Haemophilus* sp. (2 cases), *S aureus* (2 cases), and *Klebsiella* sp. (1 case) (table 1). Pleural effusion was present in 5 patients with positive haemocultures for *S viridans* (table 2) and in 9 with *S pneumoniae* positive haemocultures.

DISCUSSION

The findings of the present study suggest that VS is the second most common agent isolated as cause of community acquired pneumonia among children under 5 years of age. One blood culture reveals an aetiological agent in 33% of children with a diagnosis of CAP.

Blood cultures were utilised as a non-invasive method to identify the aetiological agent of CAP. In the study, a diagnosis was made on the grounds of positivity in only one blood culture in 33% of cases. The rigorous microbiological protocol that was adhered to when processing the collected blood, is likely to have contributed to the recovery of microorganisms in one third of the patients. Nonetheless, it should be pointed out that the patients included in our study had a high likelihood of having a bacterial pneumonia. *S pneumoniae*, isolated in 54.3% (18/33) of the positive haemocultures, was the most common causal agent of pneumonia in our cases, confirming the role of *S pneumoniae* as the main aetiological agent of paediatric CAP. Several other studies have corroborated this finding.[2 3]

It was surprising, however, that VS was the second most common isolated agent; it was recovered from 30.3% (10/33) of positive blood cultures. We are unaware of any previous reports of such an increased frequency of VS as the causal agent of CAP in children under 5 years of age. One could speculate that although VS has been recovered from blood cultures of patients with CAP, it may have been disregarded as the causal agent. In fact, although VS was shown to be the

Abbreviations: CAP, community acquired pneumonia; VS, viridans streptococci

Table 2 Frequency of pleural effusion according to the microorganisms recovered from blood cultures

	Pleural effusion		
	Yes	No	Total
S viridans			
S intermedius	1	0	1
S sanguis I	0	1	1
S sanguis II	2	2	4
NS	2	2	4
S pneumoniae	9	9	18
Haemophilus sp.	0	2	2
S aureus	0	2	2
Kleibsiella sp.	0	1	1
Total	14	19	33

NS, not specified.

third most frequently isolated agent from lung aspirates and pleural effusions in one study, it was not considered to be aetiologically related to the diagnosed CAP.[3] In other report *S milleri*, a specific species of VS, was isolated in children with CAP from pleural fluid in only one case, but was included among typical bacteria respiratory pathogens.[2] The first report investigating the clinical relevance of a positive blood culture for VS was a Canadian study published in 1981.[5] The authors evaluated 71 children with a positive blood culture for VS. Of 13 cases in whom VS was isolated from two blood cultures, only three had CAP. In 45 with only one positive blood culture, six had CAP.

In adult patients presenting with community acquired pneumonia in whom VS was isolated alone or with others organisms from blood, this agent was considered to be the pathogen or co-pathogen, instead of a contaminant. In these patients VS infections were associated with an underlying condition, such as neoplasia, chronic obstructive pulmonary disease, macroaspiration, and other co-morbidities.[4] In contrast to the majority of cases reported in the literature, patients with CAP caused by VS in our study had no evidence of any underlying disease. However, we cannot rule out other causes—some degree of malnutrition or dental cavities, for example.

The species of VS could be identified with certainty in 6/10 cases (table 2). *S sanguis* was the most frequently found species (66.7%).

In our study, despite being observed in 50% of the patients, pleural effusion was not a distinctive feature of VS aetiology, as it was also present in 50% of cases of pneumococcal pneumonia. In another study, needle aspiration of pleural effusion was performed in 34 children with pneumonia; VS was isolated in one case.[3] In our study however, in two cases of pleural effusion, *S sanguis* was the isolated VS. Determination of the specific species of VS may help to decide whether a recovered species is indeed associated with disease. VS has clearly been shown to have a causal association with pneumonia in underlying conditions, such as chronic obstructive pulmonary disease, cystic fibrosis, and neurological diseases.[5]

Reluctance to recognise VS as a typical bacterial respiratory pathogen may be the result of the lack of a safe and non-invasive method to demonstrate that the isolated VS is the responsible agent for the diagnosed pneumonia. It is possible that viridans streptococcal pneumonia is more common than has been previously suspected and clinicians should be alert to such a possibility.

In conclusion, the present findings suggest that viridans streptococci should not be ruled out as the cause of pneumonia when it is the only microorganism recovered from blood cultures of children with a clinical diagnosis of pneumonia.

Authors' affiliations

M Freitas, Assistant Professor of Pediatrics, Federal University of Para, UFPA, Sao Paulo, Brazil
A Castelo, Department of Infectious Disease, Federal University of Sao Paulo, UNIFESP/Escola Paulista de Medicina, Sao Paulo, Brazil
G Petty, C E Gomes, Department of Pediatrics, Pneumology Section, Federal University of São Paulo, UNIFESP/Escola Paulista de Medicina, Sao Paulo, Brazil
E Carvalho, Department of Pediatrics, Infectology Section, Federal University of Sao Paulo, UNIFESP/Escola Paulista de Medicina, Sao Paulo, Brazil

Competing interests: none declared

Correspondence to: Prof. M S Freitas, Rua Magno de Araújo, Vila dos Bancários, 20, Telegrafo, Belém, PA, Brazil, 66113-210; marlyf12@uol.com.br

Accepted 18 May 2006
Published Online First 31 May 2006

REFERENCES

1 **Health Ministry (BR)**. *Pneumonias treatment at small and medium complexity hospitals*. Brasília, 1997.
2 **Michelow IC**, Olsen K, Lozano J, *et al*. Epidemiology and clinical characteristics of community-acquired pneumonia in hospitalized children. *Pediatrics* 2004;**113**:701–8.
3 **Ribeiro TVM**, Mimica I, Cunha LGT, *et al*. Acute bacterial pneumonias in infancy: study of 123 cases. *Rev Paul Pediatr* 1987;**5**:64–70.
4 **Marrie TJ**. Bacteremic community-acquired pneumonia due to viridans group streptococci. *Clin Invest Med* 1993;**16**:38–44.
5 **Gaudreau C**, Delage G, Rousseau D, *et al*. Bacteremia caused by viridans streptococci in 71 children. *Can Med Assoc J* 1981;**125**:1246–9.