

LEUCONOSTOC BACTERAEMIA

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ABSTRACT

Leuconostoc species, a gram-positive coccal bacterium that is classically moderately susceptible to ampicillin and penicillin and resistant to vancomycin is a potential pathogen in the immunocompromised host. Twenty-eight isolates were collected from patients' blood culture specimens in the year 1989-1990. The clinical history and course of nineteen of these patients were studied. Five of them recovered without any antimicrobial therapy and in eight patients *Leuconostoc* species was isolated with other organisms in the blood culture specimens. The question arises as to when *Leuconostoc* species is of clinical significance when isolated in the blood culture specimens of patients.

Keywords: *Leuconostoc*, vancomycin

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INTRODUCTION

There has been a growing interest in the clinical significance of vancomycin resistance gram-positive pathogens recently⁽¹⁾. *Leuconostoc* species, a member of the *Streptococcaceae*⁽²⁾, is one of these pathogens⁽³⁻⁵⁾. This organism is of primary importance in the dairy, wine and sugar industries and has not been of clinical significance until recently. This is not surprising as vancomycin is now being commonly used in many hospitals with methicillin resistant *Staphylococcus aureus* infection.

This article is a description of our laboratory experience with the isolation of *Leuconostoc* species in the bloodstream of nineteen patients in Singapore.

MATERIALS AND METHODS

All blood isolates in the year 1989-1990 in the Diagnostic Bacteriology Section of the Department of Pathology, Singapore General Hospital, which were gram-positive cocci organisms and resistant to vancomycin were further identified using the following tests to further differentiate them from *Lactobacillus* and *Enterococcus* species^(1,5,9,10):

- gram staining after 24 hour growth in deMann, Rogosa and Sharpe broth
- gas production from glucose fermentation
- growth at 45°C
- aesculin hydrolysis
- growth in 6.5% NaCl
- antibiotic susceptibility testing against ampicillin, penicillin and vancomycin using the Kirby-Bauer method

The case records of patients from whom isolates have been identified as *Leuconostoc* species were then traced and their clinical history and course were studied. These patients were from two local hospitals, the Singapore General Hospital and Tan Tock Seng Hospital.

RESULTS

Twenty-eight isolates were collected but the clinical information of only nineteen patients were available and are shown in Table I. All the *Leuconostoc* isolates were moderately susceptible to ampicillin and penicillin but resistant to vancomycin. Eleven of the nineteen cases had *Leuconostoc* species as a

pure isolate in their blood cultures. Five of them did not receive any antibiotic therapy but recovered uneventfully. Four of these five patients had *Leuconostoc* species as a pure isolate in their blood culture specimens. There was only one death and this occurred within two hours of admission in a man with glioma and bronchopneumonia.

DISCUSSION

There are four known *Leuconostoc* species - *Leuconostoc mesenteroides*, *Leuconostoc paramesenteroides*, *Leuconostoc lactis* and *Leuconostoc oenos*⁽²⁾. They must be distinguished from the *Lactobacillus viridans* streptococci and *Enterococcus* species as they share almost similar biochemical properties^(1,5,9,10). Classically, it is moderately susceptible to ampicillin and penicillin with the minimum inhibitory concentration to penicillin ranging from 0.25 to 1.0 ug/ml; and it is resistant to vancomycin. Hence, unusual antimicrobial susceptibility testing patterns of presumed viridans streptococci or enterococci should alert one to the possibility of *Leuconostoc* species. Resistance to vancomycin is postulated to be due to replacement of the terminal D-alanyl-D-alanine moiety of the cell wall stem peptide with L-amino acids⁽⁶⁾. They are generally susceptible to cephalothin with intermediate or high level resistance to the second and third generation cephalosporins. It is also generally susceptible to lincosamides and aminoglycosides⁽⁷⁾.

In other published reviews, a common feature found with *Leuconostoc* bacteraemic patients is their immunocompromised state⁽⁶⁾. Our local experience however, showed that it could also be found in the immunocompetent hosts. The portal of entry is uncertain. It is known that the natural habitat is foodstuff of dairy, wine and vegetable products. Hence, the gastrointestinal tract is a potential reservoir from which infection may arise.

From our case studies, a similar susceptibility pattern was seen ie moderate susceptibility to ampicillin and penicillin and resistance to vancomycin. Not all the isolates appeared to be of clinical significance as five of the nineteen patients recovered without any administration of antibiotic. This seems to suggest that these isolates are not of any clinical significance at all. Yet, there were eleven patients with *Leuconostoc* species as a pure isolate in their blood cultures of whom seven responded to the appropriate antibiotic therapy given. For the eight patients in whom the *Leuconostoc* species were isolated with other organisms the question arises as to whether these were contaminated blood culture results. On comparing the clinical features in whom no antimicrobials were given with those whom the appropriate antimicrobials were given where *Leuconostoc* species were isolated as a pure isolate, the following potential predisposing factors to *Leuconostoc* bacteraemia

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Table I - Clinical Isolates of *Leuconostoc* species

Case	Sex/Age	Underlying Disease	Other Concomitant Bacterial Isolates	Treatment	Outcome
1	F/unknown	Endstage renal failure with AV fistula abscess	-	Erythromycin	Survived
2	M/78 yr	CRF, DM with broncho-pneumonia	-	Ampicillin	Survived
3	F/66 yr	DM, liver diseases with <i>V. vulnificus</i> septicemia	-	Ceftriaxone Amikacin	Survived
4	M/26 yr	Right foot abscess and <i>Staph. aureus</i> septicemia	<i>Pseudomonas</i> sp. <i>Ps. maltophilia</i>	Penicillin Cloxacillin Ceftriaxone Gentamicin Fusidic acid	Survived
5	F/73 yr	DM with chronic OM	-	Ampicillin Cloxacillin	Survived
6	M/61 yr	Left hemiplegia with right UL pneumonia	<i>Pseudomonas</i> sp.	Pefloxacin	Survived
7	M/65 yr	Right LL pneumonia	-	Penicillin Gentamicin	Survived
8	M/19 yr	Right leg abscess	<i>Enterobacter</i> sp. <i>Pseudomonas</i> sp.	Ampicillin	Survived
9	F/46 yr	MVP with endocarditis	<i>Enterococcus</i> sp. <i>Pseudomonas</i> sp.	Penicillin Gentamicin	Survived
10	M/45 yr	Lefort II fracture	-	Ampicillin Cloxacillin	Survived
11	M/23 yr	Asthma with right pneumonia	-	Ampicillin	Survived
12	F/6 day	Prematurity with PDA	-	-	Survived
13	F/26 yr	Steven Johnson's syndrome with unknown underlying cause	-	-	Survived
14	M/37 yr	PTB with drug-induced hepatitis	<i>C. parapsilosis</i> <i>C. krusei</i>	Ampicillin	Survived
15	M/3 mth	Viral fever with cutaneous candidiasis	-	-	Survived
16	F/66 yr	COLD*	-	-	Survived
17	F/38 yr	Nil*	<i>Enterobacter</i> sp. <i>E. coli</i>	Ampicillin	Survived
18	M/30 yr	Post-appendectomy wound infection	Group D non-enterococcus sp. <i>Ac. anitratus</i> <i>Staph. aureus</i>	-	Survived
19	M/28 yr	Glioma with broncho-pneumonia	<i>Klebsiella</i> sp. Group D non-enterococcus sp.	Penicillin	Died

KEYS:

- * = These patients presented with pyrexia of unknown origin.
- AV = Arterio-venous
- CRF = Chronic renal failure
- DM = Diabetes mellitus
- OM = Osteomyelitis
- UL = Upper lobe
- LL = Lower lobe
- MVP = Mitral valve prolapse
- PDA = Patent ductus arteriosus
- PTB = Pulmonary tuberculosis
- COLD = Chronic obstructive lung disease

appeared likely: prolonged hospitalisation and the use of canulas.

CONCLUSION

The *Leuconostoc* species has been considered as a potential pathogen especially in the immunocompromised host. Its clinical significance in other patients may be questionable. Further work needs to be done to determine if the *Leuconostoc* species are part of the skin flora and thus give rise to contaminated blood culture results when the skin is not adequately cleansed prior to blood sampling. It would be also necessary to determine the conditions in which these isolates would be of clinical significance.

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