

Vancomycin

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= Abstract =

Clinical Observations in Vancomycin-Resistant *Enterococci* Isolated from Pediatric Patients

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Purpose : Since the first report of vancomycin-resistant *enterococci*(VRE) in 1986, the resistance to vancomycin in *enterococci* has been increasingly rapidly. In this study, we investigated the clinical manifestations of pediatric patients with VRE and the pattern of the antibiotic use with increasing the rate of VRE in pediatrics

Methods : We studied retrospectively 36 pediatric patients who were isolated VRE from January 1998 to December 2000. We classified patients into ICU and non ICU groups and reviewed species of VRE, specimens in which VRE were first detected and procedures performed before VRE detected.

Results : We have found that the number of pediatric patients isolated VRE is increasingly annually in this study. In addition, the number of VRE-isolation in the ICU group and in patients who were operated or who underwent active procedures is much higher than that of in the non ICU group and in patients who were taken medication only. *Enterococcus faecium* is the main species of VRE. VRE showed high resistance to almost all antibiotics except tetracycline, and resistance was closely related to the duration of hospitalization and history of the antibiotic use. The proportion of the cephalosporin use was higher than any other antibiotic before VRE detection. In contrast, that of teicoplanin was higher than any other antibiotic after VRE detection($P<0.05$). The cases of superinfection is higher in the ICU group than in non ICU group.

Conclusion : In the hospital level, prevention of nosocomial infection through proper administrative policies, through surveillance of high risk VRE regions and prudent antibiotic use can prevent VRE outbreaks and corresponding side effects.

Key Words : Vancomycin resistant *enterococci*, ICU group, Surveillance, Superinfection

* 2001 51

Vancomycin (vancomycin-resistant *enterococci*, VRE) 1986
 10 가
 1). 1993

vancomycin 14%가 VRE 2). 90
 methicillin
 가, penicillin aminoglycoside
 가 glycopeptide 가
 VRE 가

1997 vancomycin
 MIC가 8 µg/mL

3 7).
 VRE
 가 VRE

1.
 1998 1 2000 12 36
 15
 VRE가 36 (median age : 1 9
 (2 15), 14 , 22)
 surveillance test 가 4

2.
 36

,
 ,
 ICU
 Non ICU

National Committee for Clinical Laboratory Standards (NCCLS) Muller-Hinton 16 18
 가 ICU
 Non ICU

3.
 SPSS Win 8.0
 nonparametric method, ICU
 non-ICU Student's t-test
 P value<0.05

1. VRE
 1998 8 , 1999 10 , 2000 18
 가 (Fig. 1), ICU
 27 , Non-ICU

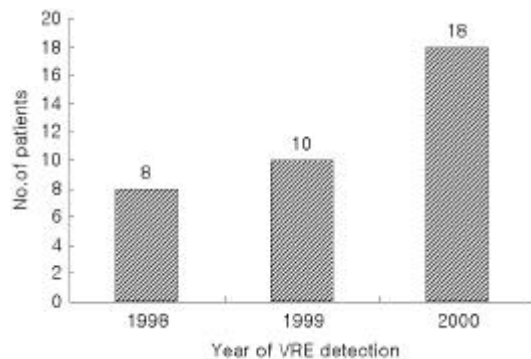


Fig. 1. Number of patients detected VRE in a year(1998 2000).

Table 1. Organism, Specimen and Previous Management before the Detection of VRE

		ICU group(n=27)	non-ICU group(n=9)	Total(n=36)
Organism	<i>E. faecium</i>	25	9	34
	<i>E. faecalis</i>	2	0	2
Specimen	Urine	21	7	28
	Blood	2	1	3
	CSF	2	1	3
	Catheter tip	2	0	2
	Operation	9	7	16
Previous management	Intervention	14	1	15
	Medication only	4	0	4
	None	0	1	1

9 . VRE *Enterococcus faecium* 34(ICU/ non ICU 25/9) , *Enterococcus faecalis*가 2(2/0) . 가 28(21/7), 3(2/1), 3(2/1), tip 2(2/0) , 36 16(9/7) , 15(14/1) 4(4/0) , 1(0/1) (Table 1).

2 .

36 VRE tetracycline 가 (Fig. 2)($P<0.05$). 27.08 (1 100) 가 cephalo- sporin 가 ($P<0.05$), 가 penicillin aminoglycoside 가 chloramphenicol vancomycin 가 teicoplanin , teicoplanin 가 30 , (P<0.05)(Table 2), teicoplanin 가 2 , 가 4 , 26.1 , 41.5 , 30.3 vancomycin teico- planin 가 (Table 22.8 4 96 (Table 4). 3). VRE가 , VRE가

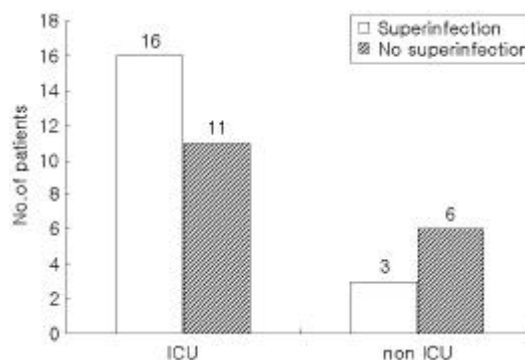


Fig. 2. Superinfected or not in the ICU/non ICU Group($P<0.05$).

Table 2. Antibiotics Susceptibility of Vancomycin resistant *E. faecium*

	No.(%) of isolated <i>E. faecium</i>		
	Sensitive	Intermediate	Resistant
Ampicillin	0(0.0%)	0(0.0%)	34(100.0%)
Ciprofloxacin	3(8.9%)	10(29.4%)	21(61.8%)
Erythromycin	0(0.0%)	0(0.0%)	34(100.0%)
Tetracyclin	26(76.5%)	0(0.0%)	8(23.5%)
Teicoplanin	9(26.5%)	8(23.5%)	17(50.0%)

가 30 , 가 2 , 가 4 , 26.1 , 41.5 , 30.3 (Table 4).

3. Superinfection in the ICU/Non ICU Group

36 가
 ICU group 16 , Non ICU group 3 ICU
 가 (Table 3)(P<
 0.05), Acinetobacter baumannii 8
 , Pseudomonas aeruginosa 7 , Klebsiella pneu-
 monia 7 , Staphylococcus aureus 4 , Escherichia
 Coli 3 , Serratia marcescens 2 , Klebsiella oxy-
 toca 2 , Proteus vulgaris 1 , Citrobacter freundii
 1 가 .

glycopeptide
 Van A, Van B, Van C, Van D, Van E 가
 6, 7). Van A, B
 가 8 10). Van A E. faecalis E. faecium
 vancomycin teicoplanin

Table 3. The Ratio of Duration Using the Anti-
 biotics between Pre/Post Detection
 of VRE

Antimicrobial agents	Pre-detection	Post-detection
Penicillin	0.45 ± 0.43	0.33 ± 0.41
Aminoglycoside	0.47 ± 0.40	0.52 ± 0.43
Cephalosporin*	0.64 ± 0.37	0.61 ± 0.44
Vancomycin†	0.11 ± 0.22	0.079 ± 0.21
Teicoplanin	0.014 ± 0.065	0.25 ± 0.35
Chloramphenicol	0.00 ± 0.00	0.016 ± 0.075

*P<0.05, P value between cephalosporin and other
 antibiotics, †P<0.05, P value between vancomycin
 and teicoplanin

Group A streptococci, Streptococcus viri-
 dans, Listeria monocytogenes, Staphylococcus aureus
 가 . Van B
 E. faecium E. faecalis vanco-
 mycin teicoplanin

van A ligase
 76% . Van C E. gallinarum, E.
 casselflavus, E. flavescens vanco-
 mycin 가 teicoplanin
 가 Van A Van B

가
 VRE -lactam amino-
 glycoside 11)

가
 1995 (Hos-
 pital infection Control Practice advisory Committee,
 HIPAC) vancomycin
 12). VRE

. , vancomycin
 lactam
 ,
 lactam
 , antibiotic-associated colitis
 metronidazole

Table 4. Outcome of Patient Detected VRE

	No more detection	Follow up loss	Expire
No. of patients	30	2	4
Duration between admission and detection of VRE(day)	26.1(1 100)	41.5(7 69)	30.5(17 44)
Time to the undetection(day)	22.8(4 96)	-	-

cin 가 VRE 7 vancomycin 가 , VRE
 1 ,
 1 ,
 1 vancomycin 가 Bingen ²⁴⁾ VRE
 , VRE 15
 3 cephalosporin ,
 , , ,
 ICU Non
 ICU VRE 가 ICU
 VRE *E. faecium* 가 5 2
^{13 16)} .
 VRE
 , CDC VRE가
 1 VRE가 2 4 Non ICU
 가 3 *E. faecium* 가 2
 , PFGE
²⁵⁾ .
 VRE , teicoplanin
 , vancomycin
 , CDC
 1 aminoglycoside cephalosporin
 3 가 가 . ciprofloxacin
 가 . cin tetracyclin 가
 ,
 VRE VRE 가
 VRE 가
^{17 21)} .
 VRE 10
^{22 24)} . VRE Zervos ²³⁾ ,
 가 , 1996
 Hiramastu VISA(vancomycin in-
 termediate *S. aureus*) VRE vancomycin
 가
 VRE
²⁶⁾ .
 ICU vanco-
 mycin
 , surveillance test (focused micrologic surveillance)

가 VRE 가

VRE) : 1986 vancomycin (가
10

VRE 가 VRE

: 1998 1 2000 12

VRE 36 , ICU
Non ICU

가 ICU Non ICU

: , VRE가 가
가 , ICU

E. faecium *E. faecalis*

VRE tetracyclin ce-

phalosporin 가

teicoplanin 가

, teicoplanin , ICU

Non ICU 가

: 가 VRE , ICU
VRE

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