

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

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

7.9%가
vancomycin
14%가 VRE ²⁾. 90
methicillin
가, penicillin aminoglycoside
가 glycopeptide 가
VRE 가

3 .
. 1997 vancomycin
MIC가 8 µg/mL
3 7) .

VRE
가 VRE
가
1 .

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

2 .
36 ,

, ,
, ,
ICU
Non ICU
,
National Committee for Clinical Laboratory Standards (NCCLS) Mull-
er-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

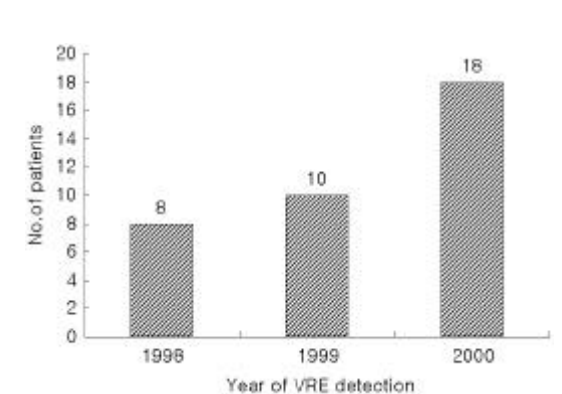


Fig. 1. Number of patients detected VRE in a year(1998-2000).

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* 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
aminoglycoside 가 penicillin
col 가 chlorampheni-
col vancomycin 가 teicoplanin
teicoplanin 가
($P<0.05$)(Table 2), teicoplanin
가
vancomycin teico-
planin 가 (Table 22.8
3). VRE가 , VRE가

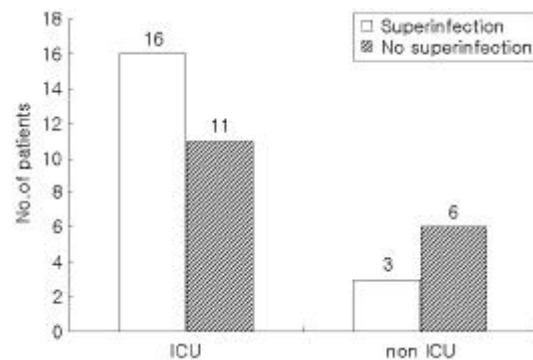


Fig. 2. Superinfected or not in the ICU/non ICU Group($P<0.05$).

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

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)	-	-

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
 ,
 .

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

,
,
,
가 VRE 가

: 1986 vancomycin (가
VRE) 10

VRE

VRE 가

: 1998 1 2000 12

VRE 36 , ICU

Non ICU

가 ICU Non ICU

: , VRE가 가
가 , ICU

E. faecium *E. faecalis*

VRE tetracyclin ce-

phalospirin 가

teicoplanin 가

, teicoplanin

Non ICU 가

: 가 VRE ICU
, VRE

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