Clinical analysis of prognostic factors in Methicillin-Resistant *Staphylococcus aureus* bloodstream infection: association with 30-day mortality.

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Introduction

Methicillin-resistant *Staphylococcus aureus* (MRSA) is one of the major pathogens that causes hospital and community acquired infections. In particular MRSA bloodstream infection (BSI) carries serious clinical course with high mortality.
The aim of this study is to reveal the prognostic factors of MRSA-BSI in Showa University Hospital in Japan.

Materials and Methods

Setting: Showa University Hospital (1000-bed teaching institution)
Patients: One hundred forty cases with MRSA BSI were included between January 2009 and December 2013.
Methods: Susceptibility test was measured by microdilution method.
(VCM MIC was strictly evaluated. : 0.5, 0.75, 1.0, 1.25, 1.5, 1.75, 2.0 mcg/ml)
We determined patient background, laboratory data, underlying diseases, source of infection, initial anti-MRSA agent and dosing period. We also analyzed the factors contributing to 30-day mortality.

Results

1. No significant differences were observed between the survival and mortality groups for patient characteristic.
2. Univariate analysis showed significant differences with VCM MIC (Table 1).
3. Multiple logistic regression analysis showed significant differences with VCM MIC (≥1.5 μg/ml) (Table 2) .
4. 30-day mortality rate was significantly higher VCM MIC (≥1.5 μg/ml) in VCM-treated group(Figure 1).

Conclusions

In this study, VCM MIC was closely associated with 30-day mortality. Many recent studies have examined the impact of high VCM MIC(≥1.5 μg/ml) on outcomes of patients with MRSA infections[1]. Similar results were demonstrated in the present study[2].

Results

Table 1 Univariate analysis of factors related 30-day mortality

Factors	Survive (n=99)	Death (n=41)	p-value
Age (years)	71 (52-81)	73 (58-85)	0.320
Sex (Male/Female)	60/39	27/14	0.560
Weight (kg)	48.5±17.7	47.6±16.4	0.775
Comorbid disease			
Malignancy	26.3% (26/99)	22.0% (9/41)	0.592
Diabetes mellitus	28.3% (28/99)	31.7% (13/41)	0.685
Renal failure(Hemodialysis)	22.2% (22/99)	29.3% (12/41)	0.376
Body temperature (C°)	38.6±0.9	38.1±1.3	-
BT > 38.0 or < 36.0	73.5% (72/98)	65.9% (27/41)	0.366
White blood cell (× 10^3/μl)	13.0±8.4	12.3±8.4	-
WBC > 10 or < 4	73.5% (72/98)	65.9% (27/41)	0.366
Serum albmin (mg/dl)	2.6±0.7	2.3±0.6	-
albmin < 3.0	78.1% (75/96)	87.5% (35/40)	0.205
Creatinine clearance (mg/dL)	48.2±36.2	40.6±34.5	0.256
Colonization of MRSA	66.7% (66/99)	58.5% (24/41)	0.361
Central venous catheter	51.5% (51/99)	68.3% (28/41)	0.068
insersion period of catheter	1.0 (0-17)	4.0 (0-15.5)	0.403
Length of stay (days)	70 (42-118)	34.0 (15.5-73)	-
Source of infection			
Skin, soft tissue and bone	15.2% (15/99)	12.2% (5/41)	0.793
Central nervous system	3.0% (3/99)	0% (0/41)	0.556
Lower respiratory tract	9.1% (9/99)	14.6% (6/41)	0.373
Intra-abdominal	11.1% (11/99)	17.1% (7/41)	0.406
Intravascular	63.6% (63/99)	15.9% (27/41)	0.848
Kidney and urinary tract	7.1% (7/99)	2.4% (1/41)	0.437
Medical devices	47.5% (47/99)	58.5% (24/41)	0.268
Types of anti-MRSA agent			
no treatment	21.2% (21/99)	29.3% (12/41)	0.307
vancomycin	61.6% (61/99)	46.3% (19/41)	-
teicoplanin	6.1% (6/99)	10.3% (4/41)	-
arbekacin	4.0% (4/99)	4.9% (2/41)	-
linezolid	6.1% (6/99)	4.9% (2/41)	-
daptomycin	1.0% (1/99)	4.9% (2/41)	-
Minimum Inhibitory Concentration			
vancomycin	1.0 (0.75-1.25)	1.25 (1.0-1.5)	0.007
VCM MIC ≥1.5 (μg/ml)	12.1% (12/99)	29.3% (12/41)	0.014
teicoplanin	1.0 (2.0-2.0)	1.0 (0.75-1.5)	0.253
linezolid	2.0 (2.0-2.0)	2.0 (2.0-2.0)	0.593
daptomycin	0.5 (0.5-1.0)	0.5 (0.5-1.0)	0.128

mean±S.D., median(25-75 percentiles), %(No./total)

Table 2 Multivariate analysis of factors related 30-day mortality

Factors	β	AOR	95% CI	p-value
VCM MIC ≥ 1.5 (μg/ml)	0.988	2.685	1.071-6.733	0.035
Central venous catheter	0.583	1.792	0.817-3.931	0.145

Multivariate - multiple logistic regression (Forced entry)
Hosmer and Lemeshow test = 0.791
Variables identified as significant for each group at P < 0.1 were entered into multiple logistic regression models.
β:partial regression coefficient, AOR:adjusted odds ratio, CI:confidence interval

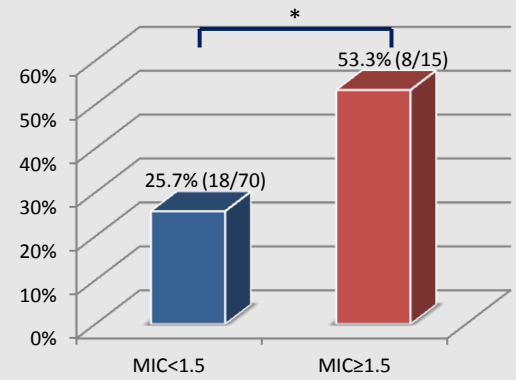

Figure 1 30-day mortality in VCM-treated group.
* P = 0.036, odds ratio=3.302 (95%CI, 1.048-10.399)

References

1) van Hal SJ, Fowler VG Jr. : Is it time to replace vancomycin in the treatment of methicillin-resistant Staphylococcus aureus infections? Clin Infect Dis. 2013 Jun;56(12):1779-88.
2) Holmes NE, Turnidge JD, Munckhof WJ, et al: Antibiotic choice may not explain poorer outcomes in patients with Staphylococcus aureus bacteremia and high vancomycin minimum inhibitory concentrations. J Infect Dis. 2011 Aug 1;204(3):340-7.