

SERUM VANCOMYCIN LEVELS IN HEMODIALYSIS: PRELIMINARY RESULTS

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OBJECTIVES

Vancomycin is a critical antibiotic for the treatment of Gram-positive organism infections. In hemodialysis (HD) vancomycin dosing is poorly defined (1). In the past, HD patients were treated with vancomycin infusion of 1 g weekly at the end of dialysis session. However, current guidelines recommend more intensive dosing regimens in order to obtain serum vancomycin (sV) trough levels of 15-20mg/L and improve clinical outcome (2). An initial investigation of sV was conducted in HD.

METHODS

We prospectively studied 16 HD patients with evidence of vascular access infection [M/F=11/5, 70(42-81) years old, on HD treatment thrice weekly for 16(3-96) months]. Patients received vancomycin infusion during the last hour of dialysis session, for 7 consecutive HD sessions (sessions 0-6), at a load dose of 1g (session 0) and maintenance dose of 500mg (sessions 1-6). Pre-dialysis sV1, sV4 and sV7 were measured before HD sessions 1, 4 and 7 respectively and were evaluated in association with vancomycin doses, patient demographics and medical history and with dialysis session details.

RESULTS

Figure 1. Vancomycin doses administered and trough sV before HD sessions 1, 4, 7

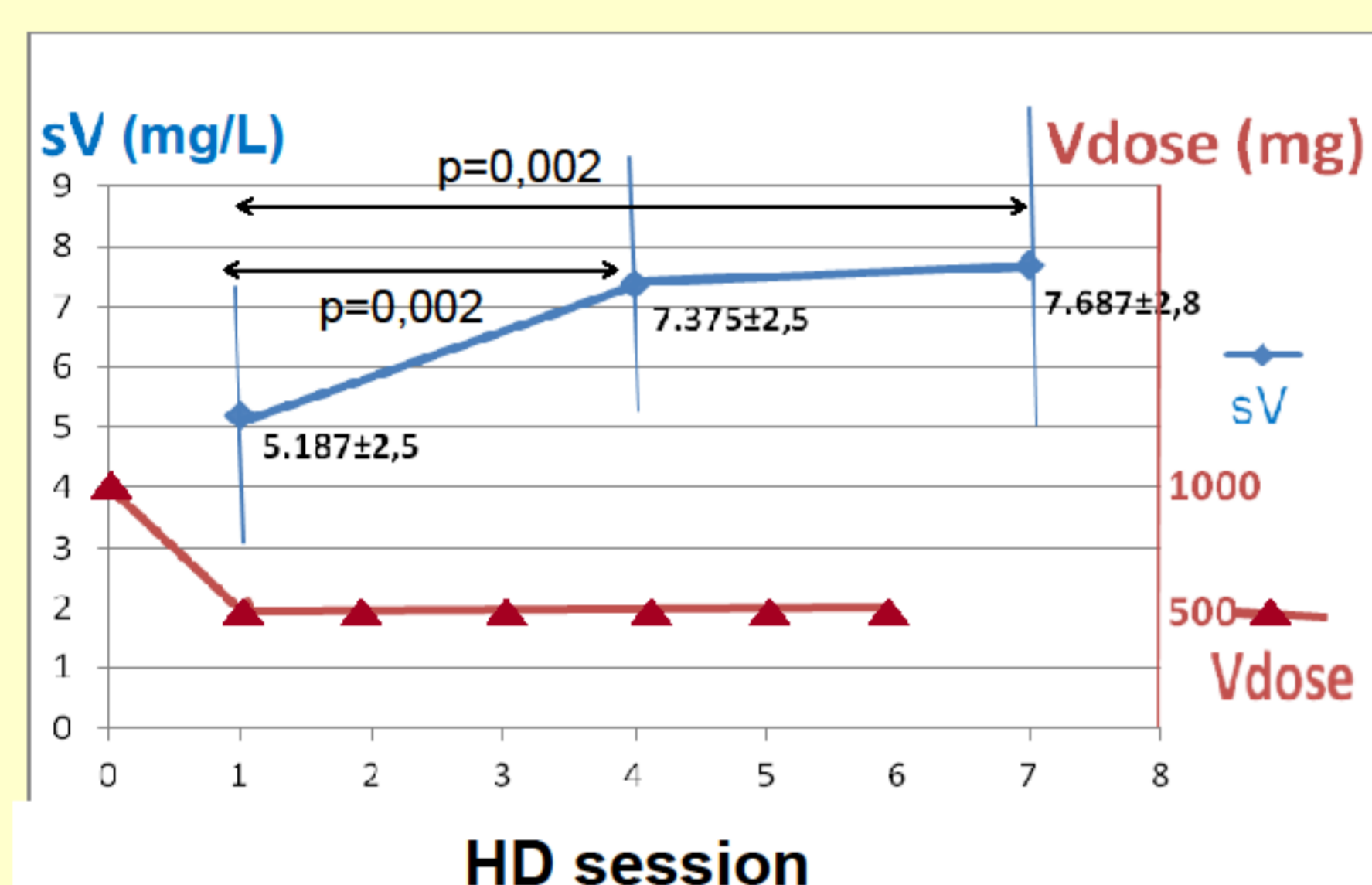


Figure 2. Trough sV1, sV2 and sV3 for low and high flux membranes

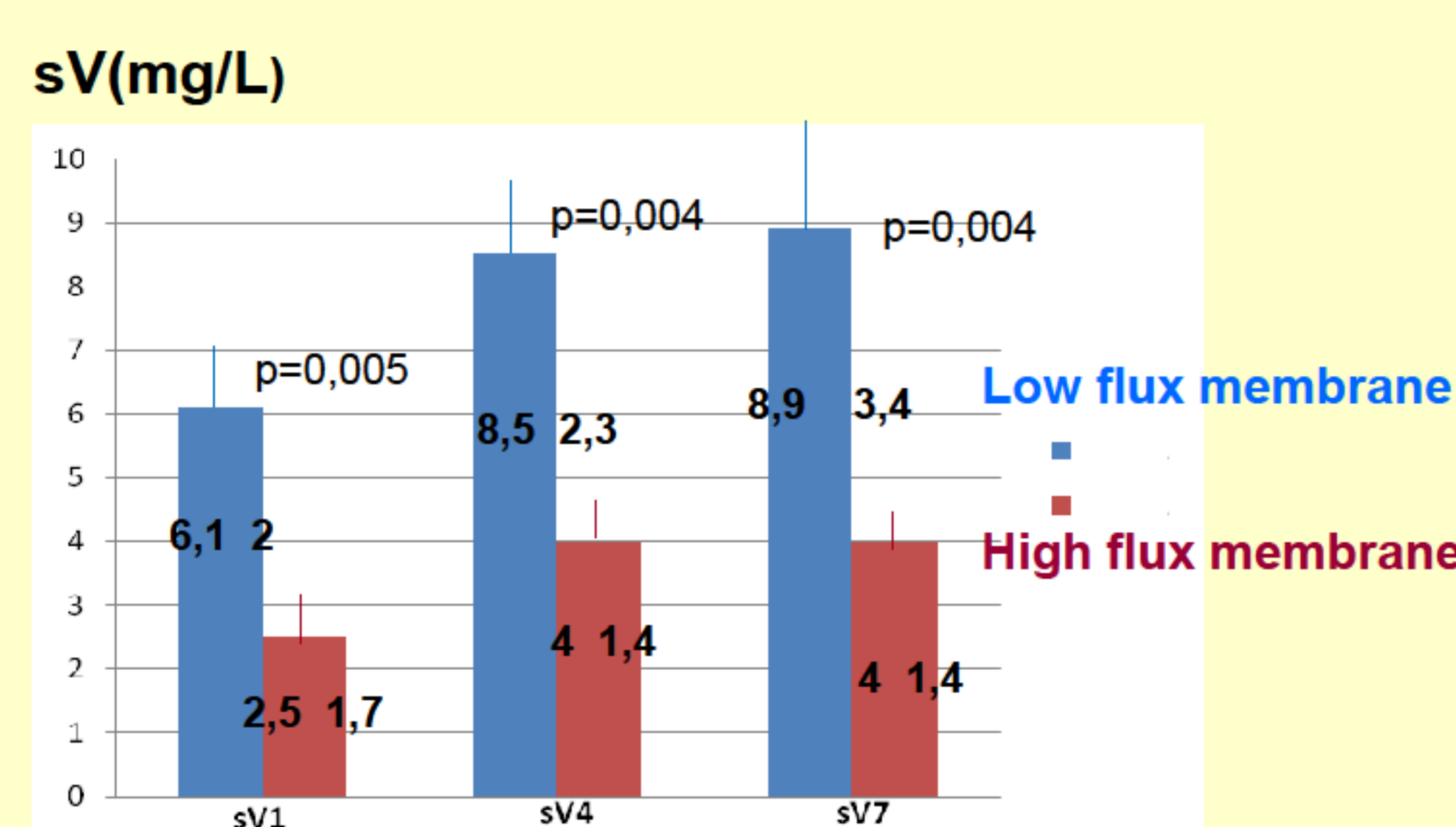


Table 1. Correlations of sV with various parameters

PARAMETER	sV1		sV4		sV7	
	R	p	R	p	R	p
Age	-0,303	NS	-0,117	NS	0,050	NS
Months on HD treatment	-0,129	NS	-0,295	NS	-0,331	NS
Dry body weight	-0,186	NS	0,023	NS	-0,032	NS
Diuresis	0,209	NS	2,230	NS	0,317	NS
Vancomycin last dose /kg*	0,186	NS	0,321	NS	0,069	NS
Times from preceding dose of vancomycin to trough sV	-0,195	NS	0,017	NS	-0,109	NS
Duration of last HD session	0,139	NS	-0,261	NS	-0,350	NS
Blood flow of last session	-0,097	NS	-0,065	NS	-0,057	NS
UF volume of last session	-0,304	NS	-0,255	NS	-0,208	NS
Membrane surface	-0,604	0,01	-0,703	0,01	-0,705	0,01

- Patients received a load vancomycin dose of 13,1±2,4mg/kg (median, 13,3; range, 9-16,7) and 6 maintenance doses of 7±1,8mg/kg each (median, 6,8; range, 3,8-10,6). The dosing regimen resulted to sV1 of 5,2±2,5mg/L (median, 5; range, 3-11), sV4 of 7,4±2,5mg/L (median, 7,5; range, 3-11) and sV7 of 7,7±2,8 mg/L (median, 8; range, 3-12). Compared with sV1, both sV4 and sV7 showed a statistically significant increase (p=0,002 respectively) (figure 1).
- Patients dialyzed with high-flux dialyzers (n=5) had lower sV1, sV4 and sV7 compared with patients dialyzed with low-flux dialyzers (figure 2).
- Significant negative correlations were observed between membrane surface and all sV separately. No significant correlations of sV could be found with age, gender, ideal or actual body weight, diuresis, time interval between vancomycin administration and next predialysis sV measurement, blood flow, ultrafiltration rate and vancomycin dose (table 1).

CONCLUSIONS

Under the vancomycin dosing regimen used, pre-dialysis trough sV levels

- increased with time during treatment period but
- remained significantly below recommended concentrations (2,3), being even lower than 10mg/L,
- especially in patients treated with high flux HD (4,5).

Intensification of the vancomycin dosing regimen in order to achieve higher predialysis sV levels should be the object of further investigation.

References

1. Pallotta KE1, Manley HJ. Vancomycin use in patients requiring hemodialysis: a literature review. *Semin Dial.* 2008;21(1):63-70
2. Rybak M, Lomaestro B, Rotschafer JC, et al. Therapeutic monitoring of vancomycin in adult patients: a consensus review of the American Society of Health-System Pharmacists, the Infectious Diseases Society of America, and the Society of Infectious Diseases Pharmacists. *Am J Health Syst Pharm* 2009; 66:82-98
3. Vandecasteele SJ, De Bacquer D, De Vriese AS. Implementation of a dose calculator for vancomycin to achieve target trough levels of 15-20 microg/mL in persons undergoing hemodialysis. *Clin Infect Dis.* 2011 Jul 15;53(2):124-9.
4. Zelenitsky SA, Ariano RE, McCrae ML, Vercaigne LM. Initial vancomycin dosing protocol to achieve therapeutic serum concentrations in patients undergoing hemodialysis. *Clin Infect Dis.* 2012 Aug;55(4):527-33.
5. Soto Guerrero Y, Hernández Castillo R, Santiago E, Ramírez Yuch N, Jaime Anselmi F, Jové R, Flores R, Lebrón R, Ramírez Rivera J. Evaluation of a vancomycin dosing regimen for patients on high flux hemodialysis: an observational study. *Bol Asoc Med P R.* 2012;104(3):10-4.