Chirurgie cardiaque (anesthésie, hémostase, transfusion)

ID: 305

Early pressure response to vasopressin in cardiac patients with refractory vasoplegic shock is associated with survival: a cohort analysis

A. Rizk*(1), V.Berthoud(1), B.Bouhemad(1), G.Pierre Grégoire(1), M.Nguyen(1)

(1) Département d'anesthésie réanimation, CHU DIJON BOURGOGNE, Dijon, France

**Auteur présenté comme orateur*

Position du problème et objectif(s) de l'étude:
To this day, vasopressin has essentially been explored as a vasopressor-sparing strategy for refractory septic shock and few studies have focused on its use for cardiac injury coupled with vasodilatory shock. We hypothesized that vasopressin pressure-responsive patients would both present a lower mortality rate and display reproductible characteristics that could allow for better selection in future trials.

Matériel et méthodes:
This monocentric, retrospective study was conducted in the cardiac surgical ICU of Dijon university Hospital between July 2020 and September 2022. MAP and vasopressor doses were recorded in patients with cardiac dysfunction and refractory vasoplegic shock who were receiving Vasopressin. Primary endpoint was 30-day mortality rate. Secondary endpoints included pressure response kinetics and vasopressin adverse effects. The research was approved by the institutional review board (IRB 00010254 - 2023 – 025).

Normality was assessed using the Shapiro–Wilk test. Quantitative data were presented as medians (interquartile range) or means (standard deviation). Groups were compared with the Student's t-test and the Kruskall–Wallis nonparametric test. Qualitative data are presented as frequency and percentage and compared using chi-squared or Fisher's exact tests. A multivariate analysis by logistic regression adjusted on the main confounders identified was carried out.

Résultats & Discussion:
A total of 100 patients were analysed in this study. At vasopressin initiation, patients median NE dose was of 1.44 [1.02;2.40] ug/kg/min, 56% of patients were assisted by ECLS and 53% had renal replacement therapy. The initial dose of vasopressin was 0.03 UI/min. 79 % of patients died 30 days after vasopressin initiation. Neither admission causes, shock type nor the ongoing organ support were associated with 30 day mortality. In the overall population, MAP significantly improved in the hour following vasopressin injection. MAP presented a significant association to 30-day survival beyond the H4 time point (83.7 [72.2;94,3] ; 68.0[63.8;75.5] p: < 0.001). Norepinephrine doses were lower in survivor groups for the H8 and H12 time points.

Regarding drug safety, 33% of patients developed ischaemic complications, 20% had acute mesenteric ischaemia. which we found to be associated with longer vasopressin administration (29.5 [13.2;56.0] vs 48 [28; 108] hours, p< 0.01).

Conclusion:
Among cardiac patients with refractory vasoplegic shock, vasopressin use significantly improved mean arterial pressure. In addition, early pressure response was associated with improved 30-day survival. Pressure response should ideally be evaluated 4 hours from injection point. Nonetheless, the considerable amount of ischemic complications recorded in this study suggest that vasopressin should be used with caution.

	ALL (*n*= 100)	Alive (30 days) N = 21	Dead (30 days) N = 79	p
Age (year)	64.0 [58.0;72.0]	61.0 [55.0;69.0]	64.0 [58.5;72.0]	0.171
Gender (Male)	76 (76.0%)	17 (81.0%)	59 (74.7%)	0.756
Body mass index (kg/m²)	26.2 [23.2;28.8]	25.0 [22.1;28.4]	26.4 [23.4;28.8]	0.659
Medical history (n,%)				
Arterial hypertension	52 (52.0%)	10 (47.6%)	42 (53.2%)	0.836
Heart failure	37 (38.1%)	8 (40.0%)	29 (37.7%)	1.000
Coronaropathy	47 (47.0%)	9 (42.9%)	38 (48.1%)	0.856
Renal failure	19 (19.0%)	3 (14.3%)	16 (20.3%)	0.756
Treatments (n,%)				
Angiotensin receptor blockers	20 (20.2%)	5 (23.8%)	15 (19.2%)	0.760
ACE inhibitors	20 (20.2%)	3 (14.3%)	17 (21.8%)	0.553
Beta blockers	46 (46.5%)	12 (57.1%)	34 (43.6%)	0.390
sacubitril-valsartan	10 (10.1%)	3 (14.3%)	7 (8.97%)	0.438
Cause of admission (n,%)				0.570
Medical	56 (56%)	13 (61.9%)	43 (54.4%)	
Emergent surgery	21 (21%)	5 (23.8%)	16 (20.3%)	
Elective surgery	23 (23%)	3 (14.3%)	20 (25.3%)	
Cause of cardiac dysfunction (n,%)				0.765
Cardiac arrest	31 (31%)	7 (33.3%)	24 (30.4%)	
Cardiopulmonary bypass	28 (28%)	5 (23.8%)	23 (29.1%)	
Ischemic	14 (14%)	3 (14.3%)	11 (13.9%)	
Sepsis	6 (6%)	0 (0.00%)	6 (7.59%)	
Acute on chronic	9 (9%)	2 (9.52%)	7 (8.86%)	
Other	12 (12%)	4 (19.0%)	8 (10.13%)	
Associated cause of shock (n,%)				
Hemorrhagic	20 (20.0%)	4 (19.0%)	16 (20.3%)	1.000
Septic	31 (31.0%)	4 (19.0%)	27 (34.2%)	0.286
Ongoing Organ support (n,%)				
ECMO VA	56 (56.0%)	11 (52.4%)	45 (57.0%)	0.898
ECMO VV	2 (2.00%)	0 (0.00%)	2 (2.56%)	1.000
RRT	53 (53.0%)	10 (47.6%)	43 (54.4%)	0.757
Severity scores				
SOFA	11.0 [9.00;13.0]	10.0 [9.00;11.0]	11.0 [10.0;13.0]	0.033
SAPS 2	55.0 [46.0;71.0]	46.0 [37.0;51.0]	59.0 [48.0;73.0]	<0.001
Vasopressor and inotrope				
Epinephrine (n,%)	7 (7.00%)	1 (4.76%)	6 (7.59%)	1.000
Dobutamine (n,%)	44 (44.0%)	5 (23.8%)	39 (49.4%)	0.064
Norepinephrine (µg/kg/min)	1.44 [1.02;2.40]	1.45 [0.74;2.05]	1.44 [1.08;2.50]	0.312
Steroids (n,%)	79 (79.0%)	16 (76.2%)	63 (79.7%)	0.766
Vasopressin characteristic at initiation				
Time from NE initiation (hours)	6.00 [3.00;16.5]	8.50 [3.75;16.0]	6.00 [3.00;17.5]	0.971
Initial dose (UI/min)	0.03 [0.02;0.03]	0.03 [0.02;0.03]	0.03 [0.02;0.03]	0.713

Table 1. Baseline characteristics of the patients.

ACE: angiotensin converting enzyme; ECMO: Extracorporeal membrane oxygenation; VA veno-arterial; VV: Veno-venous; RRT: Renal replacement therapy; SOFA: Sequential organ failure assessment; SAPS: Simplified acute physiology score.

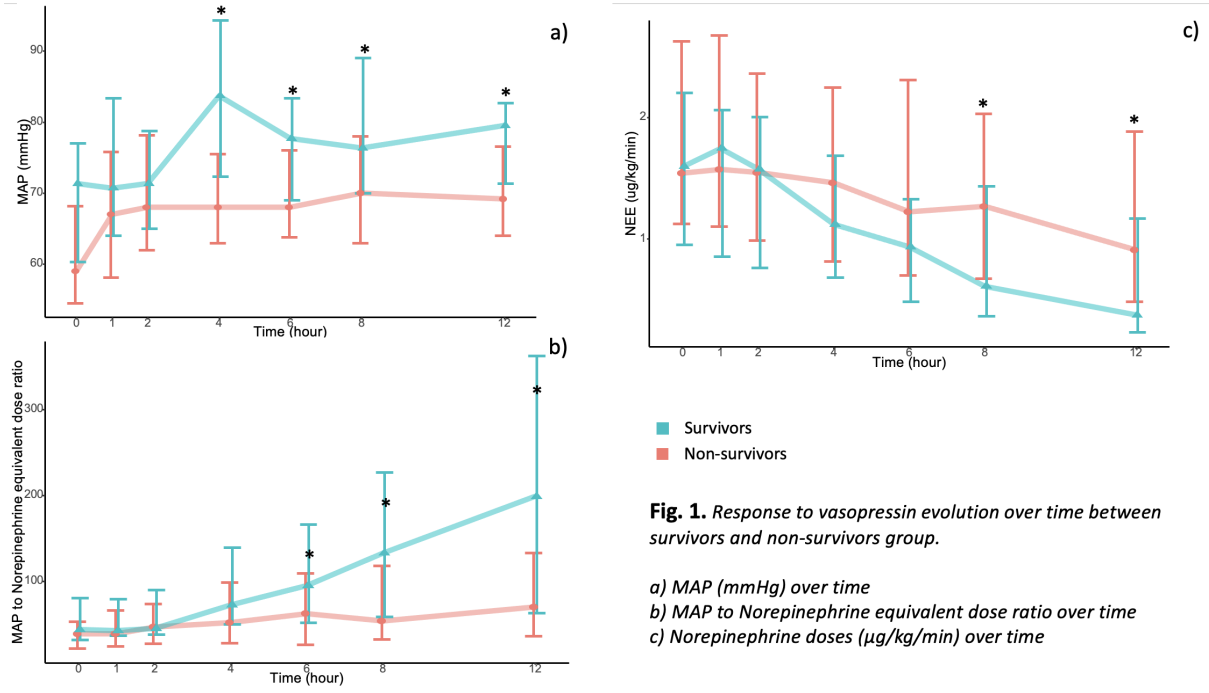

Fig. 1. *Response to vasopressin evolution over time between survivors and non-survivors group.*

a) MAP (mmHg) over time
b) MAP to Norepinephrine equivalent dose ratio over time
c) Norepinephrine doses (µg/kg/min) over time

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