Hormone levels during cardiopulmonary resuscitation in out-of-hospital cardiac arrest

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Objectives: The effect of hydrocortisone and vasopressin during advanced life support (ALS) in out-of-hospital cardiac arrest (OHCA) with heterogeneous causes remain controversial. We investigated hormone levels during ALS according to the specific cause of arrest in OHCA patients.

Methods: We performed a single-center retrospective analysis of prospectively registered data of OHCA patients (June 2016 - December 2017)

- Blood samples were taken early during ALS; cortisol, adrenocorticotrophic hormone (ACTH), and antidiuretic hormone (ADH) were measured
- Correlation between each hormone level and outcome of patients were examines
- Relationship between each hormone level and specific cause of arrest was examined

Results: 250 OHCA patients were included in the final analysis

- There was no significant association between cortisol levels and patient outcomes
- Cortisol levels were significantly higher in patients with sepsis
- Cortisol levels were significantly lower in patients with trauma
- ACTH levels were significantly higher in patients with good neurological outcome, sepsis and acute coronary syndrome
- ADH levels were not significantly associated with outcomes, and were reported as the upper limit of the measurement range in most patients
- ADH levels were significantly lower in patients with sepsis and acute coronary syndrome as cause of arrest

Conclusion:

- Cortisol, ACTH, and ADH levels during ALS in OHCA patients are different between etiologies of arrest
- Even though cortisol and ADH levels are not associated to patient outcomes, high ACTH level in OHCA is associated with good neurological outcome

Table 1 Outcomes of patients

	n =250
Sustained ROSC, n (%)	111 (44.4)
Survival admission, n (%)	100 (40)
Survival discharge, n (%)	46 (18.4)
Good CPC, n (%)	17 (6.8)

Table 2 Overall hormone values

	n	median (IQR)	normal range
Cortisol (µg/dl)	192	16.23 (8.26~31.34)	5~25
ACTH (pg/ml)	188	114 (49~306)	10~60
ADH (pg/ml)	175	80 (35.3~80)	0.0~6.7

Fig 1. Distribution of hormone levels

Table 3 Association Between Hormones and Patient outcomes

		Cortisol				ACTH				ADH			
		n =	Median (µg/dl)	IQR (µg/dl)	P-value	n =	Median (pg/dl)	IQR (pg/dl)	p-value	n =	Median (pg/dl)	IQR (pg/dl)	p-value
Sustained ROSC	yes	96	20.15	8.27~32.46	0.232	97	113	44~338	0.900	89	80	36.7~80	0.951
	no	96	15.87	7.79~29.74		91	118	56~265		86	80	32.2~80	
Survival to admission	yes	87	19.1	8.17~31.37	0.411	87	115	48~345	0.550	80	79.2	36.2~80	0.761
	no	105	16	7.92~31.37		101	110	51~273		95	80	32.1~80	
Survival to discharge	yes	39	21.67	10.39~30.80	0.388	39	172	51~491	0.084	35	80	47.8~80	0.454
	no	153	16.09	7.29~31.43		149	100	49~258		140	80	32.9~80	
Good outcome	yes	12	23.4	14.47~31.45	0.176	12	475	162~590	0.001	12	80	56.3~80	0.460
	no	180	16.05	7.36~31.34		176	101	48~277		163	80	32.1~80	

Table 4 Association between Hormones and specific causes of arrest

	Cortisol				ACTH				ADH			
	n =	Median (µg/dl)	IQR (µg/dl)	P-value	n =	Median (pg/dl)	IQR (pg/dl)	p-value	n =	Median (pg/dl)	IQR (pg/dl)	p-value
ACS	43	16.09	10.11~26.06	0.820	42	229	63~411	0.034	16	41	18~77	0.010
Heart Failure	17	15.73	6.92~30.31	0.826	17	138	63~249	0.913	17	54	24~80	0.200
Resp. Failure	31	21.19	9.74~31.01	0.668	29	118	37~373	0.994	27	80	35~80	0.611
Sepsis	15	49.29	33.12~64.98	<0.001	17	323	138~1122	0.004	44	74	30~80	0.025
SAH/ICH	16	11.47	4.94~25.38	0.189	9	57	28~100	0.007	6	42	34~80	0.436
Hypovolemia	16	12.26	7.09~19.95	0.217	16	92	47~298	0.799	13	80	48~80	0.236
Metabolic	11	25.01	17.48~49.65	0.057	8	79	37~537	0.588	15	80	58~80	0.441
Trauma	6	5.35	0.33~11.78	0.009	5	63	21~181	0.211	4	80	53~80	0.327

Fig 2. Cortisol levels according to specific cause of arrest