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Psychosocial sequelae following cardiac arrest

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ABSTRACT

Background: Cardiac arrest (CA) leads to cerebral hypoxia resulting in multifactorial brain injury. Cognitive impairment and a higher degree of depressive symptoms are the most frequently described mental health problems after CA. The aim of the present study is to characterize psychosocial sequelae of CA.

Methods: The study population included 113 subjects. 63 patients after CA were matched to 51 healthy controls according to demographic characteristics and premorbid intelligence level. Cognitive test (MoCA), inventories of depressive (BDI-II) and anxiety symptoms (STAI) and midlife crisis scale (MCS) were administrated to study participants.

Results: The analysis showed that CA patients have a decreased level of cognitive performance ($p = 0.016$) and a higher degree of state anxiety symptoms ($p = 0.023$). There was no significant difference between CA patients and control subjects in the degree of depressive ($p = 0.435$) and trait anxiety symptoms ($p = 0.542$). Ex-post facto analysis based on logistic regression indicated that the strongest predictors of being classified as having had a cardiac arrest was male gender and state anxiety (OR = 4.45 and .50). Discriminant function analysis showed that group prediction was sensitive to age, cognitive performance, and state anxiety ($\lambda = 0.81$, $p = 0.028$).

Conclusions: Our results show that CA has significant cognitive and neuropsychiatric sequelae. The integration of psychosocial care and neuropsychiatric treatment into the complex medical care of CA patients seems to be justified.

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Introduction

Resuscitated cardiac arrest (CA) and sudden cardiac death are fatal complications of cardiovascular disease [1]. In health care systems with well-functioning prehospital emergency care and hospital complex intensive care, including the standard use of target temperature management, the percentage of surviving patients has been increasing [2,3]. Frequently, it has become possible to reach a satisfactory neurological outcome, which enables survivors to return to a normal life [3,4]. Nevertheless, even in these patients, the quality of life and their psychosocial functioning have been shown to be decreased [3–7].

During CA, many pathological processes take place, the most serious of which is cerebral hypoxia [8]. Long-term psychosocial effects of the hypoxic-ischemic injury may be manifested as a cognitive deficit or higher levels of anxiety and depressive symptoms [9,10,34].

Regarding the tolerance of brain tissue toward hypoxia, the most sensitive are the white matter and the temporal neocortex [11]. Following their injury, a cognitive deficit of the vascular type is often observed [6,12]. This is manifested as a decrease in memory function and attention accompanied by disorders of certain executive functions, such as mental flexibility, set shifting and decreased the motor speed of upper limbs [12].

The extent of cerebral hypoxia sequelae can be derived from the behavioral performance of patients which is measured by a five-point scale Cerebral Performance Category (CPC) [13]. Previously published data indicate that while CA survival rate is 21%, 17% of CA patients achieve a favorable neurological outcome as classified by CPC stage 1–2 [14,15]. Both the survival and the neurological outcomes depend on initial rhythms, i.e. shockable (ventricular fibrillation/tachycardia) and non-shockable (asystole, pulseless electrical activity) [16]. CA patients with shockable rhythms demonstrate the higher resilience of neurological decline after CA and have more favorable prognosis [16,17].

Decreased quality of life in CA survivors has also been linked to the increased occurrence of anxiety and depression symptoms [5,18,33]. Their morphological basis is the hypoxic injury of the brain centers for behavioral control, i.e. the white matter of the left prefrontal lobe connected to the amygdala and the limbic system [8,9]. Anxiety and depressive symptoms are often described as a comorbidity of CA in connection with a poorer ability of cognitive functioning, especially in learning new information [19,20]. CA can also cause changes in the social functioning, mainly regarding the interactions between the patients and their close relatives [21–23]. These psychosocial changes are the result of a combination of the post-hypoxic brain injury and the reflection on patient's confrontation with death, which can cause experiences resembling those in midlife crisis [21,23]. Attention focus on the patient's health, restriction of social life and increased responsibility are the psychosocial sequelae of cardiac arrest, influencing both the patient himself and his close relatives [21].

In the present study, the main goal was to describe whether the cognitive performance and mood significantly impact the psychosocial functioning of CA survivors.

Methods

Study design

Between November 2012 and December 2014, 62 survivors of CA were recruited from three cardiac arrest centers, i.e. the Department of Cardiology, Institute for Clinical and Experimental Medicine in Prague, Second Department of Internal Medicine, Cardiovascular Medicine, General University Hospital in Prague and Tomas Bata Regional Hospital in Zlin (the patient sample, Table 1). A control sample consisted of 51 healthy individuals examined at the Department of Neurology, 1st Faculty of Medicine and General University Hospital in Prague (Table 1). The project was performed in a manner consistent with the Ethical Principles of Charles

Table 1 – Demographic and clinical characteristics of cardiac arrest (CA) and control sample (CS).

	CA patients ($N = 62$)	CS ($N = 51$)	Statistical test	p value
Gender (% male)	79	49	11.2[a]	0.001[*]
Age (years)	59.5 ± 14.3	55.1 ± 14.8	1284[b]	0.087
Education (years)	12.7 ± 3.1	13.0 ± 2.5	1736[b]	0.374
NART/CRT	110.3 ± 11.6	113.9 ± 10.1	1887[b]	0.078
Time since CA (months)	47.4 ± 31.9	–	–	–
CA duration (minutes)	20.7 ± 19.5	–	–	–
CA classification (% shockable rhythm)	96			

CA = cardiac arrest; CS = control sample; M = mean; SD = standard deviation; data presented as $M \pm SD$ or frequency (percentage); NART/CRT = National Adult Reading Test/Czech Reading Test (measure of premorbid intelligence level expressed as number of errors in the test transformed into IQ score based on regression equation from Wechsler Adult Intelligence Scale—Revised/WAIS-R); Time since CA (months) = time elapsed since CA till test administration in number of months; CA duration (minutes) = time since receiving the call to restoration of heart function in minutes; CA classification = percentage of CA patients with shockable rhythm.

[a] χ^2 test.

[b] Mann–Whitney U-test.

[*] $p \leq 0.05$.

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