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THE LAZARUS PHENOMENON: FAMILIAR?

Abstract: Introduction. The Lazarus phenomenon or the Lazarus syndrome, as it is also known, refers to the spontaneous return of circulation after unsuccessful resuscitation. This is a rare phenomenon, but it can lead to very unpleasant situations in clinical practice, and depending on circumstances, may have legal implications. The frequency of this phenomenon is relatively low, however many clinicians report experiencing it, with a prevalence rate of up to 50% among intensive care and emergency medicine physicians. The Lazarus phenomenon was first described in 1982, in Finland. Several heterogeneous possible mechanisms have been proposed to explain its occurrence. Aims of paper is to highlight possibility of the Lazarus phenomenon occurrence, and to minimize the risk of oversight. The paper uses an anonymous survey to assess physicians' knowledge about the phenomenon.

Methods. For the paper is used an anonymous survey, which is created at the web-site *app.surveypplanet.com*. The survey contained just one question – Are you familiar with the Lazarus phenomenon, with suggested answers: 1 – yes, 2 – no. At the survey participated 134 internal medicine residents on Medical Faculty University of Belgrade.

Results. Of 134 participants, 64 reported knowing about the phenomenon, while 70 did not have knowledge of its existence.

Conclusion. Number of physicians who lack knowledge about the Lazarus phenomenon highlights the need for more intensive education at all educational level.

Key words: Lazarus phenomenon, resuscitation, auto-resuscitation

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Introduction

The Lazarus phenomenon or the Lazarus syndrome, as it's also known, presents spontaneous recovery of circulation (in Anglo-Saxon literature is used the acronym ROSC – Return of Spontaneous Circulation) after unsuccessful resuscitation (in Anglo-Saxon literature is used the acronym TOR – Termination of Resuscitation) [1]. The phenomenon named after the biblical character Lazarus/ Lazarus from Bethany, whom Jesus resurrected four days after death. This is a relatively rare phenomenon, with a prevalence regarding to some literature of 5.95/100.000 outpatient interrupted resuscitations [2]. The phenomenon's frequency isn't negligible from a clinician's perspective, cause 37–50% intensive care unit and emergency service doctors report it [3, 4, 5]. Some authors think that the occurrence of the Lazarus phenomenon is under-reported, due to the fear of possible consequences [4]. According to same source, almost a half of doctors faced the occurrence of the Lazarus phenomenon during their work, the minority learned about it during postgraduate and continuing education.

There are papers which suggested occurrence of the Lazarus phenomenon without the previously started (and ended) resuscitation [6]. The phenomenon was firstly described in 1982 in Finland, in three patients after giving up of a resuscitation [7].

In the emergence of the Lazarus phenomenon several mechanisms play a role. Possible mechanisms are shown in the Table 1, with the indication of the cause of cardiac arrest and outcomes.

Table 1 Possible mechanisms of the emergence of the Lazarus phenomenon

Cause of cardiac arrest	Outcome	Suggested mechanisms of the Lazarus phenomenon occurrence
Mesenteric artery embolism	recovery without consequences	lung hyperinflation
Digitalis poisoning	death after 12 days due to sepsis	lung hyperinflation
Abdominal aorta aneurysm rupture	discharged without consequences, normal life for five weeks	delay effect of applied adrenaline
Myocardial infarction	complete recovery	myocardial perfusion due to atheromatous plaque migration
Head and chest trauma	lethal outcome in intensive care unit	delay drug's effect, decreased intrathoracic pressure after resuscitation's ending, improved cerebral perfusion after taking off a cervical collar

In the table are listed the data from literature which deal the investigation the Lazarus phenomenon with, with causes of cardiac arrest and outcomes for comparison. It can be concluded that the outcome is not directly associated with the cause of cardiac arrest, either with suggested mechanism of the emergence of the Lazarus phenomenon, which are heterogeneous, but are not completely understood [8]. It's important to note that this area is not completely known and researched [9].

The mechanisms of the emergence of the Lazarus phenomenon can be analysed retrospectively and in the light of performed and applied medical procedures [10]. The most common suggested etiopathogenic mechanism of the return of spontaneous circulation is hyperventilation [11], but there are mentioned the other possible suggested mechanisms, such as a delay of drug effects applied during resuscitation [12]. The basic pathophysiological mechanisms probably aren't completely clarified [13].

The aim of the paper is to indicate to possibility of occurrence of Lazarus phenomenon, as a potential problematic situation in a clinicians' daily work. The aim of the paper is to point how clinicians are familiar with phenomenon existence, with the purpose of planing further educations at the all level doctor's education.

Methods

For the paper preparation was used the anonymous survey, which was created on the web-site *app.surveyplanet.com*. The survey was created with only one question – Are you familiar with Lazarus phenomenon, with possibility to choose just one of two answers: 1 – yes, 2 – no. It is impossible for one respondent to vote more than once.

The survey was active 48 hours and had 134 participants-internal medicine residents in Medical Faculty University of Belgrade. For eliminating any possibility linking the answer with the respondent, residency year, sex or resident's institution weren't analysed.

This is a volunteer survey, which doesn't include work with patients, either analyses any medical datum, there was no need to obtain ethic committee approval.

Results

64 (47,76%) of 134 respondents answered that are familiar with Lazarus phenomenon, until 70 (52,24%) of 134 respondents answered that not familiar with it.

Discussion

There are not many papers dealing with the Lazarus phenomenon, the available literature mostly consists of case reports from clinical practice. In Serbia, according to available data, there are no studies investigating this phenomenon or physicians'

knowledge about it. In the research of Gerard and colleagues conducted in France, almost no doctors were aware about the Lazarus phenomenon and its meaning, but the majority of respondents were familiar with the term auto-resuscitation, defined as the spontaneous return of circulation after unsuccessful resuscitation [4]. Our results indicate that physicians in our study were relatively well informed about the existence of the Lazarus phenomenon.

Conclusion

The importance of Lazarus phenomenon occurrence is reflected in its potential legal implications, but also in the possible unpleasant situations it make create in clinical practice. In daily practice, healthcare professionals should be aware of the real possibility of the occurrence of Lazarus phenomenon, and know how to manage it. Doctors should wait at least ten minutes before issuing the death certificate, because of the possible occurrence of the Lazarus phenomenon. Mandatory reporting of Lazarus phenomenon, and education as well, could contribute to awareness of its occurrence among healthcare professionals.

The limitations of our study include the relatively small number of participants and the narrow professional scope of the respondents. Further assessment of knowledge regarding this phenomenon is warranted, as well as the implementation of a comprehensive study involving physicians from all specialties, and other healthcare professionals.

Declarations

Conflict of Interest. Authors declare no conflict of interests.

Disclosure of AI Use. Authors didn't use AI.

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