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THE LAZARUS PHENOMENON - A REMARKABLE CASE OF SPONTANEOUS RECOVERY FROM CARDIAC ARREST IN A DO-NOT-RESUSCITATE PATIENT

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ABSTRACT

The Lazarus phenomenon, or autoresuscitation, is a rare clinical entity defined as the spontaneous return of circulation in patients following cardiac arrest. Here we report the case of an 88-year-old female who suffered cardiac arrest and received no intervention due to her code status. Despite this, she regained a pulse and consciousness after 167 seconds of pulseless ventricular tachycardia and 108 seconds of asystole consecutively, surviving through pacemaker placement and discharging 5 days later with an intact neurological status. We demonstrate that although rare, favorable outcomes with autoresuscitation are possible, even when no intervention is provided. We also provide a novel explanation for her recovery adding to existing theories on the mechanism of autoresuscitation.

KEYWORDS

Lazarus phenomenon, autoresuscitation, cardiac arrest

LEARNING POINTS

- Despite its rarity, autoresuscitation may result in favorable neurologic and functional outcomes even when cardiopulmonary resuscitation is not attempted.
- Patients should be monitored for at least 5 minutes prior to determination of circulatory death.

INTRODUCTION

The term Lazarus phenomenon was coined by J.G. Bray in 1993, and reports of this clinical entity date back to as early as 1982[1]. It is estimated to occur in 0-3% of patients following the withdrawal of cardiopulmonary resuscitation (CPR), however the true incidence and outcomes remain unknown[2]. Since the majority of the current literature on the Lazarus phenomenon describes cases where CPR is attempted and ultimately withdrawn, little is known about cases where no resuscitative efforts are made.

CASE DESCRIPTION

An 88-year-old female with a history of dementia presented to the emergency room (ER) after an unwitnessed ground

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level fall. Upon arrival, she was found to be in complete heart block with a heart rate of 32 and a QTc of 534 msec. At the time, she denied any symptoms and remained hemodynamically stable. Electrophysiology was consulted and planned for pacemaker placement the following day.

However, the morning after admission, telemetry detected sustained monomorphic ventricular tachycardia (VT) and the patient was found to be unconscious and pulseless. In compliance with her do-not-resuscitate (DNR) code status, all CPR efforts were withheld. She remained in pulseless VT, before her rhythm eventually degenerated into asystole. Surprisingly, a few moments later, telemetry monitoring showed resumption of electrical activity and complete heart block, with return of palpable pulses and spontaneous breathing. She regained consciousness and was immediately started on a dopamine drip to support her heart rate, which was in the 30s.

Closer review of telemetry revealed an R-on-T phenomenon had precipitated a short run of polymorphic ventricular tachycardia, which progressed to 2 minutes and 35 seconds of monomorphic VT, followed by 1 minute and 48 seconds of asystole, for an estimated total of 275 consecutive seconds of unassisted cardiac arrest *(Fig. 1)*. Despite a history of dementia, her mentation quickly had returned to normal following the event, sustaining no neurologic deficits. She was urgently taken to the cath lab and underwent an uncomplicated dual-chamber pacemaker placement. Following the procedure, she remained asymptomatic and without recurrence of any malignant arrhythmias and was ultimately discharged 5 days later.

DISCUSSION

Spontaneous return of circulation following withdrawal of CPR is a rare occurrence with a very poor prognosis and has unique implications for the determination of circulatory death and timing of organ harvesting. In an observational study of 631 cardiac arrest patients who had resuscitation terminated, resumption of cardiac electrical activity occurred in 14% of cases following the cessation of CPR, however, none regained consciousness or survived to discharge[2]. Although case reports exist of patients making a full recovery following withdrawal of CPR, the recovery rate of these patients is unknown. This may be due to the fact that cases of autoresuscitation events are likely heavily underreported, as a French study found that despite its rarity, 45% of ER physicians reported encountering this phenomenon. Additionally, physicians may feel as though these cases are of negligible clinical utility, as 63% believed that autoresuscitation could not lead to survival without neurologic disability and 66% withheld further CPR despite autoresuscitation[3].

In patients who never receive initial CPR, even less is known about rates of autoresuscitation. In a comprehensive review of all published cases of the Lazarus phenomenon since 1982, 8 of the 76 patients received no initial resuscitative measures, though none survived longer than

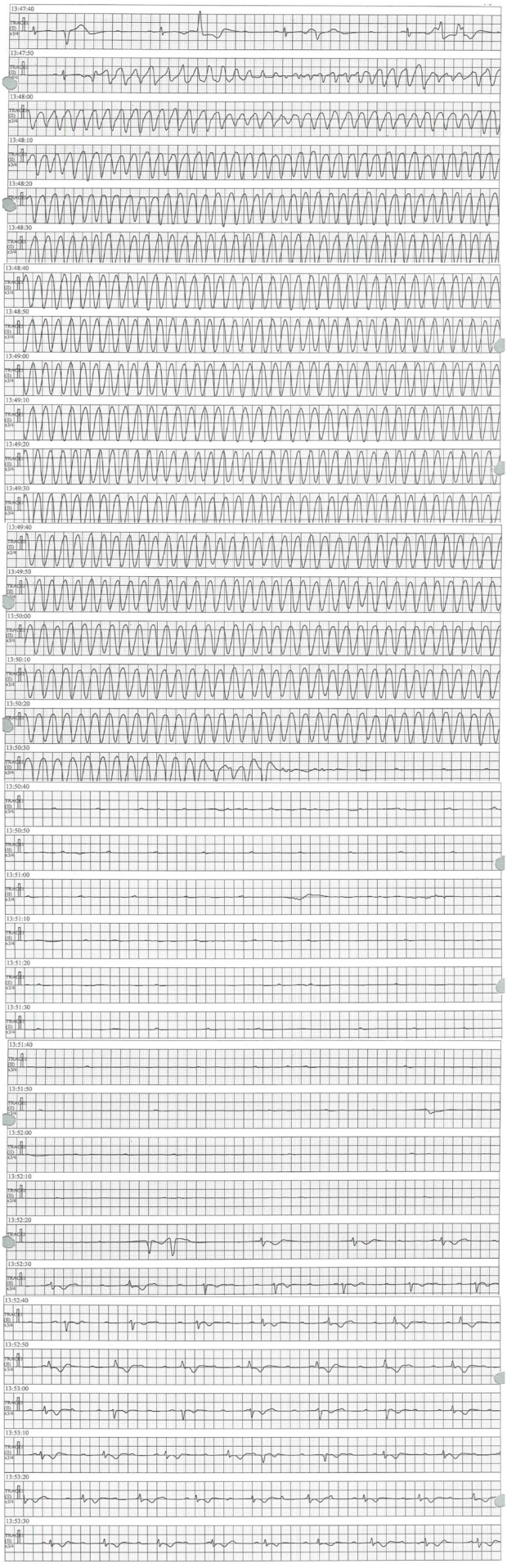


Figure 1. Telemetry recording during cardiac arrest.

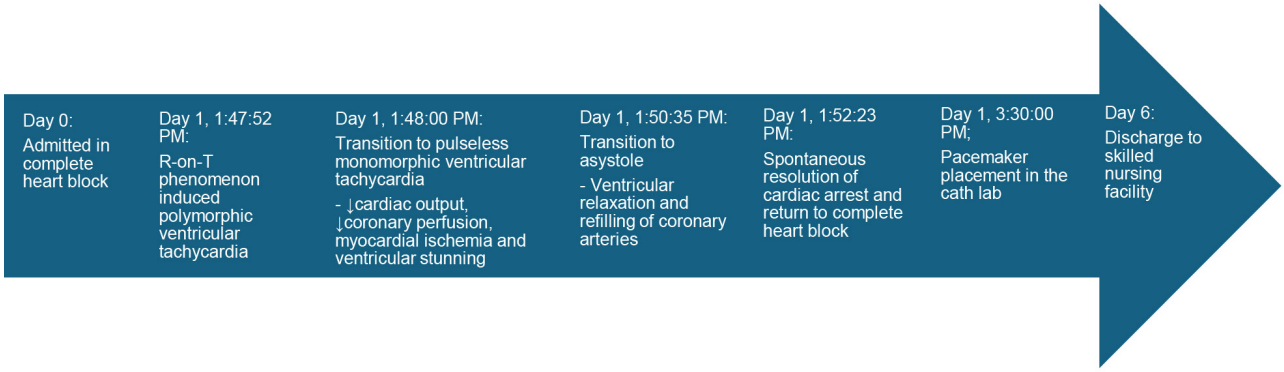


Figure 2. Timeline of events and proposed physiological mechanism of spontaneous recovery in our patient.

2 days following spontaneous resuscitation[1]. However, our patient recovered and survived to discharge 5 days later, without any neurologic deficits. We demonstrate the Lazarus phenomenon to be relevant not only in achieving spontaneous recirculation, but also meaningful neurologic recovery, even when no resuscitation is attempted.

While varied, medical guidelines generally recommend monitoring for pulselessness and apnea for at least 2-5 minutes to ensure irreversibility of circulatory arrest before confirming death[4-8]. As our patient was found in pulseless VT we estimate she remained in arrest for up to 275 seconds before spontaneous recovery occurred. This case illustrates the importance of adhering to the maximal duration of the aforementioned observational period, even in patients with a DNR code status in which CPR is never attempted. With regard to organ donation, this case also provides further support for a 5-minute observation period prior to organ harvesting.

Although the exact mechanism is unknown, reports on autoresuscitation following the withdrawal of CPR have hypothesized that hyperventilation, auto-peep, myocardial stunning from defibrillation, metabolic derangements (hyperkalemia) and delayed onset of medications may be potential causes of this phenomenon. As our patient had not received CPR, we highlight that there are likely additional factors, besides suboptimal resuscitation or complications of treatment, contributing to autoresuscitation events[1,9,10]. We hypothesize that for this patient, R-on-T induced prolonged VT had led to decreased coronary perfusion, transient ischemia and a period of temporary myocardial stunning (*Fig. 2*)[11]. Cessation of VT allows for ventricular relaxation, diastolic filling, and refilling of the coronary arteries, which potentially aided in the restoration of ventricular automaticity and enabled the Lazarus phenomenon in our patient[12]. However, this remains speculative, and we emphasize that the pathophysiology behind autoresuscitation is complex and likely multifactorial. Current theories about the mechanisms involved are insufficient in explaining all cases, particularly in patients where resuscitation is never attempted, and further research is needed to better understand the phenomenon.

CONCLUSION

Although little is known about the Lazarus phenomenon, this case shows that even in patients who do not receive any resuscitative efforts, spontaneous recovery from cardiac arrest with good neurologic outcomes is possible.

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