

CASE REPORT

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Survival after a heart attack with subsequent cardiac arrest: a 1-year patient case report

Joseph Oliver Raj Alexander^{1*} and Aparna Pattnaik¹

Abstract

Background Cardiac events have become a common occurrence worldwide and especially in India, more so after the coronavirus disease (COVID) pandemic. Apparently healthy and young individuals suffering from cardiac disorders are on the rise. In most cases, there is no clearly established cause/risk factor for the cardiac disorder. Once someone has suffered a cardiac event, the rehabilitation team is expected to keep a constant watch on the prognosis and any complications that might arise, especially during the first year after the cardiac event.

Case presentation This case report describes the sequence of events that occurred in a 44-year-old male patient who had a heart attack, survived a cardiac arrest, was implanted with a cardioverter defibrillator (ICD), and was on rehabilitation. The report throws some insights into what happened with this patient since his heart attack, and it also discusses the possible signs that could have helped identify the cardiac event before the actual occurrence.

Conclusion The rehabilitation post heart attack, angioplasty, and cardiac implants have to be individualized and tailor-made. Appropriate alterations to the rehabilitation would give the necessary direction to achieve maximum recovery and well-being of the patient. Constantly watching for any complications that might arise and addressing them immediately are vital to the prognosis. Physiotherapy rehabilitation plays a major role in giving a positive reinforcement and better prognosis.

Keywords Heart attack, Stenting, Cardiac arrest, Heart failure, ICD — implantable cardioverter defibrillator, IABP — intra-aortic balloon pump, Physiotherapy rehabilitation

Background

Cardiovascular disorders (CVD) often lead to heart attack, cardiac arrest, and heart failure which are three different terms often used interchangeably, but in reality, they indicate different things. Blockage of coronary arteries will lead to a deficient amount of oxygen supply to the cardiac muscles leading to a heart attack [1, 2]. When the heart cannot maintain its rhythm generally due to malfunction of its electrical system, it leads to cardiac arrest which might cause death if left unnoticed [3]. Heart failure is the term given to a condition when the left ventricle

is unable to pump as much blood as the body needs [4, 5]. Very often, one condition can lead to another risking the chance of survival. It is studied that by 2030, CVD will be the first cause of death with a mortality of 23.6 million worldwide [6, 7]. In India, the mortality rate was projected to rise from 2.26 million in 1990 to 4.77 million in 2020 with a hike in prevalence rate from 1.6 to 7.4% in the rural area and 1 to 13.2% in the urban area [8].

This is a case report of a 44-year-old male patient who survived multiple plaques including a 100% block in his right coronary artery (RCA), a sudden cardiac arrest that lasted 40 min, was implanted with a defibrillator, i.e., implantable cardioverter defibrillator (ICD) 5 months after the first cardiac event and has now survived 1-year post-cardiac arrest. It is an interesting case as the patient had less than a percent chance of survival at the time of cardiac arrest and has made a remarkable

*Correspondence:

Joseph Oliver Raj Alexander
rushtojoseph@gmail.com

¹ Department of Physiotherapy, Abhinav Bindra Sports Medicine and Research Institute, Bhubaneswar, India

functional recovery despite all the complications. This report emphasizes motivating all the CVD survivors to stay positive and follow a healthy lifestyle for good recovery. It also highlights the importance of physiotherapy in better prognosis after cardiac rehabilitation.

Early cardiac rehabilitation and the role of the physiotherapist in early mobilization and rationed activities during the rehabilitation program holds vital significance when it comes to marked improvement in physical function, good prognosis and promoting long-term survival. This is not only for patients undergoing major heart surgeries but also for those patients who are managed conservatively or post angioplasty and post implant of lifesaving devices.

Case presentation

The patient's consent was obtained, and ethical clearance was taken from the concerned department before the study. The patient was a 44-year-old apparently healthy male with no previous history of diabetes, hypertension, or any cardiac disorders, known to be a recreational player and led an active lifestyle until the cardiac event. Three days before the incident, the patient had visited a beach resort and had walked for around 9 to 10 km in those 2 days. No other suspectable history was reported at that time.

On the day of the incident (February 23, 2022), the patient was involved in recreational soccer, and while returning home, he experienced visual disturbances, exhaustion, and hyperhidrosis. On checking his vitals, his blood pressure was 65/45, and his pulse rate had dropped to around 40 bpm. The patient also had a fall, suffering syncope when attempting to use the washroom alone. Hereon, the patient was subconscious but oriented enough to give directions to the hospital and self-ambulatory with no support.

The patient was immediately brought to the emergency department, and further investigations were done. The electrocardiogram (ECG) report revealed ST segment elevation and a possible heart attack. The two-dimensional echocardiography (2D echo) revealed a regional wall movement abnormality (RWMA) in the RCA territory, indicative of an RCA block with ejection fraction (EF) of 50%. The angiogram indicated a 100% block of the RCA and a few other plaques in the mid anterior descending artery (LAD) and proximal left circumflex artery (LCX).

During the angioplasty procedure of thrombus removal in RCA, while the cardiologist was explaining stenting the RCA to the patient's attendant, the patient had a reflexive constriction of the coronary vessel and went into a sudden cardiac arrest. External cardiopulmonary resuscitation (CPR) was administered and continued for 40 min.

An intra-aortic balloon pump (IABP) and thrombolytic predictive instrument (TPI) support was instituted, and a couple of zotarolimus-eluting stent (ZES) resolute integrity stents were placed in RCA (4×34 mm to proximal RCA and 4×30 mm to the mid-RCA) and was externally defibrillated. The patient was on ventilator support and was given less than a percent chance of survival.

The next day, the patient showed signs of movement and had short-term memory loss for the first 2 days post-catheterization, before recovering. IABP, TPI, and ventilator support were taken off on the 4th postoperative day, and he was shifted to the ward after a total of 6 days in the intensive care unit (ICU). Follow-up angiogram showed some unexpanded portions in the stented region in intravascular ultrasound (IVUS). The unexpanded portion was post-dilated with a 4.0×15 mm Sapphire-II NC percutaneous transluminal coronary angioplasty (PTCA) balloon with good post-expansion results. The patient was discharged in a stable condition after 10 days of hospital stay.

On the first periodical review, electrocardiogram (ECG) and echocardiogram showed ectopic beats and significant arrhythmias. On subsequent review, echo indicated decreased left ventricle ejection fraction (LVEF). The cardiac magnetic resonance imaging (CMR) showed significantly dilated left ventricle with severe systolic dysfunction and a reduced ejection fraction of 21%. The ejection fraction is believed to be mostly undermined with CMR than with 2D echo [9]. The echo findings of the same patient taken the previous day revealed 35% ejection fraction. Further findings in the CMR revealed mild myocardial thinning and hypokinesia of the inferolateral wall with transmural myocardial enhancement which is a sign of nonviable infarct with fibrosis, the infarct scar volume measuring 22% (23.8 mL).

Based on these findings, the patient underwent an ICD implant after 5 months of the first cardiac event to aid the functioning of the heart and to prevent sudden cardiac arrest in future.

The 2D echo doppler taken on the night of the first incident showed 50% LVEF, which reduced to 45% on the review echo taken after 2 months and was 35% after 5 months, just before the ICD implant. The echo findings taken subsequently after the implant have shown LVEF values of 34% after 2 months of the implant and then to 33% after 10 months of the first cardiac event and is maintained at 33% after completion of 1 year.

On the other hand, the N-terminal pro-brain natriuretic peptide (NT PRO BNP) [10] value varied from 894 picograms per milliliter (pg/mL) after 2 months and 371 pg/mL after 5 months, 3687 pg/mL after 6 months and reduced to 430 pg/mL after 10 months, and to 402 pg/mL after completion of 1 year.

The patient was on fluid restrictions (1.2 litre per day until completion of 1 year, and now it is 1.5 litre per day after that). After the completion of 1 year, it remains to be seen how the condition progresses and what the prognosis would be.

Discussion

Despite all the complications, the patient comes a long way, a year after the cardiac event. The fully functional recovery without any neurological deficits after suffering a 40-min cardiac arrest can be attributed to the fact that the patient had been very active until 2 years before the cardiac event (the first quarter of 2020, after which his outdoor activity levels dropped due to COVID pandemic) and walked regularly for at least 45 min to 1 h daily, ensuring his cardiovascular fitness was preserved before his cardiac event.

The patient had no family history of CVD, no known case of comorbidities, and led an active lifestyle. Food habits, i.e., nonvegetarian, and stress levels, which are relatable, could have been the chief contributing factors for the cardiac condition. It has already been established that increased cortisol (known as the stress hormone, which usually elevates due to lack of sleep/sleep deprivation) levels correlate with increased stress levels, clearly emphasizing a minimum of 7 to 8 h of sleep to maintain good health [11].

The patient had recurrent headaches, back pain, and small rash-like reddish bumps on his skin on the lateral aspect of his left ring finger near the proximal interphalangeal joint for a few months before the cardiac event, all of which reduced drastically after the cardiac event. These could have been warning signs which were ignored or were not given the due importance. The patient also had breathlessness occasionally, which he thought was due to decreased activity levels and continuous usage of mask for prevention from COVID infection.

The fact that he is implanted with an ICD as a protective device against variations in pulse and arrhythmia can prevent any subsequent cardiac arrest due to ventricular tachycardia/ventricular fibrillation (VT/VF) that could occur from abnormal heart rhythms [12, 13]. The patient reduced in weight from 66 kg pre attack to 55 kg, 1 year after the cardiac event. This could be due to the medications (being on statins — 40 mg per day) he was taking, but it has had a positive reinforcement on his well-being, in the sense that his cardiac index would increase and that would help him maintain his functioning by improving his ventilation-perfusion, with a reduced ejection fraction and cardiac output.

The patient who is a physiotherapist by profession has given due importance to breathing exercises, rationed

daily activity limits, and constant monitoring of any abnormal signs and deviations from normal functioning.

After 1 year of the incident, with proper instructions and emergency setup, a 6-min walk test [14, 15] was conducted for the patient. The patient showed an excellent VO_2 max with a recovery time of 1 min. The SF-36 [16], a self-assessing questionnaire, was also initiated to check the patient's overall health status. The patient showed good health status. Structured aerobic exercise, physical activities, and psychological intervention with lifestyle modifications are associated with an improved coronary risk factor profile [17]. The impact of lifestyle habits on health is tremendous, and every individual should take action to improve them. It is important to follow cardiac protocols as prevention rather than rehabilitation [18].

A mention of the psychological health of the patient in a good prognosis is a must, considering the fact that he should be in a sound position to manage stress and well equipped with the mental strength to balance work and family pressures with ease without building up his stress levels. And of course, the element of divine intervention is to be considered in any critical case.

Conclusion

The patient, being a qualified physiotherapist, has followed all instructions from the physician to pace his rehabilitation in such a way as to not overdo or underdo activity levels. Walking for the prescribed 30-40 min per day at normal walking pace and not involving in any exertional activities due to the low EF and reduced blood pressure (90/65 range due to the medications) has greatly helped with the prognosis.

His knowledge as a physiotherapist had helped him in the proper pacing of activities and keeping a constant watch on abnormal signs and symptoms, like breathlessness or chest congestion. This only stresses the significance of tailor-made individualistic cardiac rehabilitation protocols for each patient taking into consideration the various factors that govern the physiological functioning of the body and the patient's psychological status as well.

Abbreviations

ICD	Implantable cardioverter defibrillator
IABP	Intra-aortic balloon pump
CVD	Cardiovascular disorder
RCA	Right coronary artery
RWMA	Regional wall movement abnormality
TPI	Thrombolytic predictive instrument
IVUS	Intravascular ultrasound
LVEF	Left ventricle ejection fraction

Authors' contributions

Joseph Oliver Raj Alexander has collected the data and written the manuscript. Aparna Pattnaik has reviewed the manuscript and conducted the tests on the patient. Both authors were involved in the patient rehabilitation.

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Availability of data and materials

The data collected and/or analyzed during the study are available with the corresponding author.

Declarations**Ethics approval and consent to participate**

The study was done at Abhinav Bindra Sports Medicine and Research Institute, Bhubaneswar, Odisha, India. Ethical clearance was taken from the ethical committee of the institute, and consent was taken from the patient. The study is not a clinical trial, so no clinical trial registration was done. The patient was aware of all procedures involved in the study, and a written consent was taken for the same.

Consent for publication

The informed written consent form was signed by the patient before participation in the study and agreed to the publication of the clinical presentation, outcomes, and investigation reports.

Competing interests

The authors declare that they have no competing interests.

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