International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2019): 7.583

# Successful Cardiopulmonary Resuscitation (CPR) Lasting 187 Minutes after Aortic İnjury during Nephrectomy

**Sibel Büyükçoban[1], Semih Küçükgüçlü[2], Bahar Kuvaki[3], Şule Özbilgin[4], Necati Gökmen[5]**

*Short title:* Prolonged CPR

"This case was presented as an oral presentation at the National Winter Symposium on 18.03.2016.(Bursa /TURKEY)"

Sibel Büyükçoban, MD. Dokuz Eylül Üniversty Faculty of Medicine Department of Anesthesiology, İzmir, Türkiye
Correspond Author Mail: *sibelbuyukcoban[at]yahoo.com*

[2]MD, Professor Dokuz Eylül Üniversty Faculty of Medicine Department of Anesthesiology, İzmir, Türkiye.
*semih.kucukguclu[at]gmail.com*

[3]MD, Professor Dokuz Eylül Üniversty Faculty of Medicine Department of Anesthesiology, İzmir, Türkiye
*bkuvaki[at]deu.edu.tr*

[4]MD, Associate Professor Dokuz Eylül Üniversty Faculty of Medicine Department of Anesthesiology, İzmir, Türkiye.
*ozbilginsule[at]gmail.com*

[5]MD, Professor, Dokuz Eylul University Faculty of Medicine, Department of Anesthesiology and Reanimation Subdivision of Critical Care Medicine, izmir, Turkey
*necatigokmen[at]yahoo.com*

**Abstract:** ***The incidence of ''intraoperative cardiac arrest'' varies from 1,1-34,6 per 10000 cases. Cardiac arrest due to acute bleeding is the leading cause of death in non-cardiac surgery. Case Report: A 43-year-old female patient, ASA I, was taken to the operating room for laparoscopic left nephrectomy under general anaesthesia. In the 162nd minute of the operation, the surgeon stated that they had injured the aorta at the level of the renal artery and had difficulty stopping the bleeding. At the 165th minute of the operation, the patient had cardiac arrest, and cardiopulmonary resuscitation (CPR) was initiated in the supine position. The patient underwent ventricular fibrillation at the 5th minute of CPR and was defibrillated. In dialogue with the cardiovascular surgeons, surgery was allowed during the interruptions, which did not exceed 1 minute, and then CPR was continued. During the 187 minutes resuscitation, 34 units of erythrocyte suspension, 38 units of fresh frozen plasma,10 of cryoprecipate and 2 pools of platelets were given. When the postoperative neurological condition was assessed after the first 48 hours, the patient was found to be conscious and cooperative. This patient recovered without neurological sequelae after massive blood transfusion and CPR, which lasted for a total of 187 minutes with intermittent manual cardiac compression periods. The outcome of perioperative cardiac arrest depends on factors such as the patient's baseline condition, the latency to starting CPR, the quality of CPR, and good teamwork.***

**Keywords:** CPR, aortic injury, nephrectomy, 187minutes

## 1. Introduction

The incidence of "intraoperative cardiac arrest" (IOCA) varies from 1.1-34.6 per 10,000 cases (1). The wide range of incidence results from the low number of cases and the different definitions of intraoperative and perioperative concepts (2, 3, 4). This is a case report about a patient who developed IOCA as a result of acute surgical bleeding due to vascular injury. This patient recovered without neurological sequelae after massive blood transfusion and CPR, which lasted for a total of 187 minutes with intermittent manual cardiac compression periods.

## 2. Case report

A 43-year-old female patient was taken to the operating room for left nephrectomy under general anaesthesia. In the 162nd minute of the operation, the surgeon stated that they had injured the aorta at the level of the renal artery and had difficulty stopping the bleeding. At the 165th minute of the operation, the patient had cardiac arrest. The patient underwent ventricular fibrillation at the 5th minute of CPR and was defibrillated. A cardiovascular surgeon was called for vascular repair. In dialogue with the cardiovascular surgeons, surgery was allowed during the interruptions, which did not exceed 1 minute, and then CPR was continued. The patient returned to normal sinus rhythm (NSR) at the 76th minute of CPR, and the mean arterial pressure (MAB) was approximately 38-42 mmHg. Vascular repair was completed at the 255th minute of surgery. However, in the 285th minute of the operation, the patient had a second cardiac arrest with pulseless electrical activity (PEA) (Figure 1). Cardiac compressions were started again, and spontaneous circulation returned after 87 minutes.

Despite effective CPR, there was no increase in oxygenation in the arterial blood gases, so acute pulmonary oedema and increased intrapulmonary vascular pressure due to rapid


Licensed Under Creative Commons Attribution CC BY

fluid and blood transfusion as well as CPR were considered (Figure 2).

A diuretic (80 mg) and methylprednisolone (1000 mg) were administered. This period of CPR resulted in spontaneous circulation (ROSC) after 77 minutes. Continuous end-tidal CO2 levels never decreased below 10 mmHg. When the postoperative neurological condition was assessed after the first 48 hours, the patient was found to be conscious and cooperative. The patient developed ileus on the third postoperative day, underwent colon resection with an ileostomy, and was extubated on the 18th day. On the 79th day, the patient was transferred from the intensive care unit to the surgical ward. Approximately three years after the event, her ileostomy was closed, and her intestinal absorption problems ended with no need for further parenteral support.

In this case, the cognitive evaluation was performed when she was hospitalized for the closure of the ileostomy 37 months after her intraoperative cardiac arrest. However, it is surprising for a patient with such long-term CPR to have such a good neurological picture in this state. In this case, no other findings other than mild atrophy in the left cerebellar hemisphere were observed with magnetic resonance (MR) imaging of the brain (Figure 3).

## 3. Discussion

In this case, IOCA developed due to an unexpected aorta injury and was rapidly diagnosed. Although there was a reversible cause, aortic repair took more time than usual because of ongoing CPR. The cardiovascular team performed surgery in intervals when the CPR team permitted the surgery. When we look at resuscitation due to aortic injuries in the literature, it is seen that mortality rates are high (5, 6, 7).

Studies have shown that pulmonary oedema is an important cause of hypoxemia and poor lung compliance during resuscitation in half of patients undergoing CPR (7). In another study, the duration of CPR and baseline pCO2 level were shown to be independent predictors for the development of severe pulmonary oedema after resuscitation (8). This was also seen in our case. However, other reasons, such as increased fluid infusion and massive transfusion, may also have played a role.

After the first dose of furosemide (80 mg), repeated doses were continued, and improvements in the oxygenation of blood gases and decreased amounts of pink foamy sputum aspirated from the trachea were observed (9). When the literature is searched for steroid use and CPR, studies support the use of various steroids to increase inotropic efficiency and improve neurological results during resuscitation or after ROSC (10,11).

Charapov et al (12) stated that especially if an irreversible cause is not clear, there should not be an upper limit for the CPR time. CPR should be maintained until any reversible causes are eliminated and until hypothermia is corrected with continuation of the shockable rhythm. No clear algorithm has yet been published for cases of intraoperative cardiac arrest. It has been emphasized that ETCO2 values can be used as real-time feedback for the quality of chest compressions and as a prognostic value for ROSC in cardiac arrest during general anaesthesia (13).

Various automatic compression devices are recommended for long-term CPR, as well as e-CPR methods (14). Many studies have shown that the use of e-CPR to save patients resistant to conventional cardiopulmonary resuscitation has also increased survival in many patient populations (15). The rates of living after cardiac arrest can be increased in centres that have prepared the team and infrastructure for rapid E-CPR application (14). In our case, e-CPR was discussed with the cardiovascular team; however, because of vascular repair, the team was against e-CPR.

Physicians should base the decision to continue CPR on several factors that affect the chances of survival after cardiac arrest (16). These factors include the patient baseline status, coexisting comorbidities, latency to CPR, latency to defibrillation, and adequacy of chest compression which should be monitored with ETCO2 and/or diastolic blood pressure. Duration of CPR is dependent on individual.

In conclusion, prolonged CPR can be performed with manpower and good teamwork. Even small pauses for reversing the cause of the arrest can be allowed if the effectiveness of cardiac compressions can be monitored with end-tidal CO2 and invasive arterial pressure measurements. The outcome of perioperative cardiac arrest depends on factors such as the patient's baseline condition, the latency to starting CPR, the quality of CPR, and good teamwork.

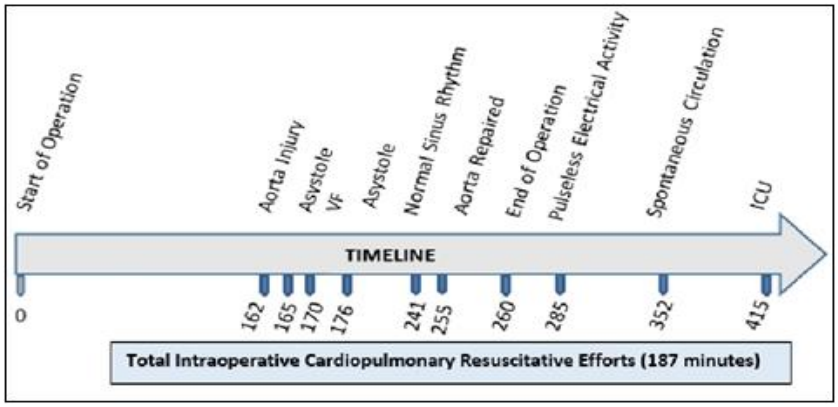



**Figure 1:** Timeline


Licensed Under Creative Commons Attribution CC BY

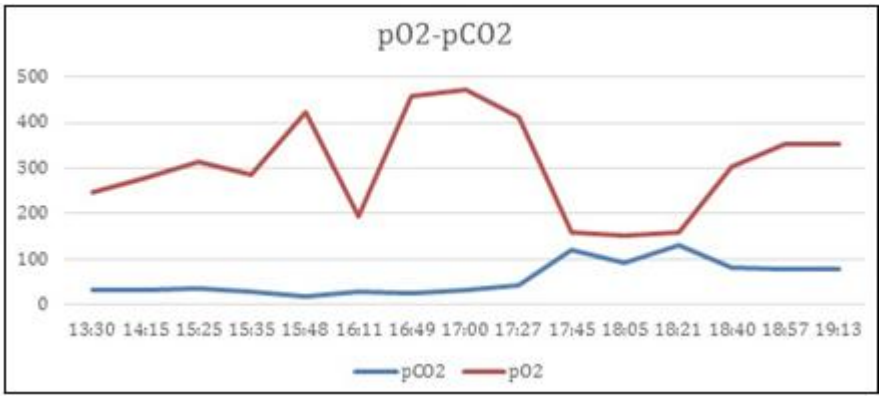



**Figure 2:** CPR 285. minute pulmonary edema developing

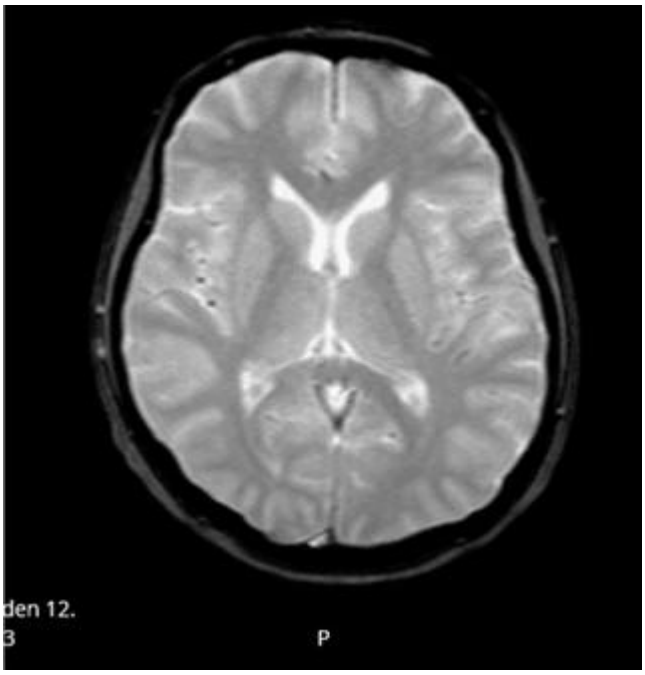


**Figure 3:** Brain Magnetic Resonance (MR)

## 4. Fund

No institutional departmental funds were received in the conduct of the study.

## 5. Conflict of interest

Authors have not disclosed any potential conflicts of interest.

Permission was obtained to publish a case report for the patient and her relatives

## References

[1] Goswami S, Brady JE, Jordan DA et al. Intraoperative cardiac arrests in adults undergoing noncardiac surgery. Anesthesiology. 2012;117:1018-26.crossref

[2] Truhlar A, Deakin CD,Soar J et all. European Resuscitation Council Guidelines for resuscitation2015section 4. Cardiac arrest in special circumtances. Resuscitationn 2015:148-201.

[3] Hinkelbein J, Andres J, Thies KC, DE Robertis E. Perioperative cardiac arrest in the operating room environment: a review of the literature.Minerva Anestesiol. 2017;83(11):1190-1198.

[4] Nunnally ME, O'Connor MF, Kordylewski H, Westlake B, Dutton RP. The incidence and risk factors for perioperative cardiac arrest observed in the national anesthesia clinical outcomes registry. Anesth Analg 2015;120:364–70.

[5] Ozdemir C, Bagcaz DS, Gungor I et all. Management of abdominal Aortic Injury in Lumbar Disc Surgery: Acase Report.Gazi Medical Journal 2020;31(2):211-13.

[6] Usman R, Ahmed H, Ahmed Z et all. Optical trocar causing aortic injury:A potentially fatal complication of minimal Access surgery. J Coll Physicians Surg Pak 2020; 30(1):85-87.

[7] Zeng L, Shu W, Ma H et all. Aortic injury caused by esophageal foreign body-case reports of 3 patients and literature review. Medicine 2020;99:26(e20849).

[8] Ornato JP, Edgar TWR, PharmD RG et all. Rapid change in pulmonary vascular hemodynamics with pulmonary edema during cardiopulöonary resuscititation. The American Journal of Emergency Medicine . 1985(3)2:137-42

[9] Kang D, Kim JE, Rhee JE. The risc factors and prognostic implication of acute pulmonary edema in resuacitated cardiac arrest patients.2015;2(1):110-16.

[10] Nimura T, Zamami Y, Koyama T et al Hydrocortisone administration was associated with improved survival in Japanese patients with cardiac arrest. Scientific Reports. 2017(7):17919.

[11] Varvarousi G, Stefaniotou A, Varvaroussis D et all. Glucocorticoids as an emerging pharmacologic agent for cardiopulmonary resuscitation. Cardiovasc Drugs Thor. 2014;28:477-88.

[12] Charapov I, Eipe N, et al. Caediac arrest in the operating room requiring prolonged resuscitation. Can. J Anesth.2012;59:578-585.

[13] Sandrori C,De Santis P, D2Arrigo S. capnography during cardiac arrest. Resuscitation 2018(138):73-77.

[14] Holmberg MJ, Gerif G, Wiberg S et all. Extracorpereal cardiopulmonary resuscitation for cardiac arrest: A systematic review. Resuscitation. 2018;131:91-100

[15] Grunau B, Hornby L, Singal RK et all. Extracorpereal Cardiopulmonary Resuscitation for refractory Out of Hospital Cardiac Arrest:The state of the Evidence anf framework for application. Canadian Journal of cardiology.2018;34(29):146-55.


Licensed Under Creative Commons Attribution CC BY

[16] Youness H, Al Halabi T, Hussein H, Awab A, Jones K, Keddissi J. Review and Outcome of Prolonged Cardiopulmonary Resuscitation. Crit Care Res Pract. 2016;2016:7384649.


Licensed Under Creative Commons Attribution CC BY

International Journal of Science and Research (IJSR)

ISSN: 2319-7064

Call for Papers | Fully Refereed | Open Access | Double Blind Peer Reviewed

Join IJSR Channel

Join IJSR.NET Channel

Quick Links

- Visit Current Issue
- Check Processing Charge
- Submit Your Article
- Search Published Articles
- Author Testimonials
- Researcher's Guide
- Recent e-Presentations
- Recent Presentations
- Recent Presentations

UGC Notification

Peer-Reviewed Journal

Qualis-CAPES (Class C)

Class C in Qualis-CAPES

Sponsors

- American Express
- SBI Credit Cards

Member's Area

- Member Sign In
- Get Registered (**Free**)

Impact Factor

- SJIF 2022: 7.942

Join Us

- Join IJSR YouTube Channel

Indexing

**5 % Discount Code** Appears Here in Next **15:00** Minutes!

# International Journal of Science and Research (IJSR)

Welcome to the **International Journal of Science and Research (IJSR)**, a platform dedicated to the dissemination of scientific knowledge and research. We are an online, **Open Access**, **Double-Blind Peer Reviewed**, and **Fully Refereed** journal committed to providing a platform for researchers worldwide.

Our mission at International Journal of Science and Research (IJSR) is to provide researchers with an accessible and reliable platform to publish their work. We are focused on quality and accessibility, ensuring that every piece of research is thoroughly reviewed and easily accessible. Our journal is published monthly, covering a wide range of scientific and research topics.

**Submit Your Article**
via Online Portal
**(Recommended Method)**

**Offline Submission:** editor.ijsrnet@gmail.com

**Submission Deadline:** Ongoing

**Accepted Language:** English

**Disciplines Covered:** Check Complete List of Subject Areas

**Type of Articles:** Research Paper, Survey Paper, Informative Article, Case Studies, Review Papers, Comparative Studies, Dissertation Chapters, Research Proposals or Synopsis, M.Tech / M.E / PhD Thesis, Photo Essay

We are proud to have published over 42,000 articles, each assigned a unique **Digital Object Identifier (DOI)** for easy citation and tracking. Our commitment to quality is reflected in our **ISO 9001:2015** certification and our stringent double-blind peer review process.

At International Journal of Science and Research (IJSR), we believe in the power of research and the impact it can have on the world. We are dedicated to supporting researchers in their quest for knowledge and are committed to providing a platform that helps their work reach the widest possible audience.

## Journal Features

| | |
|---|---|
| Double Blind Peer Reviewed | ISO 9001:2015 Certified |
| 42, 000 + Publications | Quick & Easy Publication |
| No Paper Work Required | Unique DOI for Each Article |
| Only Authentic Work | Rapid Response to Queries |
| Minimum Charges (APC) | Free e-Certificates |
| Download Statistics | Say No to Plagiarism |
| Registered with MSME | No Subscription Required |
| 256-bit (SSL) Encryption | License Under: CC-By |

## Call for Paper Publication

Join us in our journey of promoting science and research. Submit your manuscript today and be a part of our growing community of researchers.

We are pleased to announce that the International Journal of Science and Research (IJSR) is now inviting you to submit your research manuscript for possible consideration in the current issue. At International Journal of Science and Research (IJSR), we provide an international platform where authors can submit their work and get

- Google Scholar
- CrossRef Member
- CiteFactor
- e-Library.ru Index
- ScienceGate Index
- Scite_ Index
- Digital Repository Index
- Noel Meorial Library Index
- Academia.Edu Index

it published with the help of our Double Blind Peer-Reviewed Editorial Board.

We provide peer-reviewed publications of the highest quality and standards. Plus we also provide an open source feature that allows you to access your content from anywhere in the world.

We look forward to receiving your manuscript. Our Editors will review it for quality and accuracy before publishing it on our website.

Our team is available 24/7 to answer any questions or doubts you may have regarding the journal submission process. Thank you for taking the time to discover International Journal of Science and Research (IJSR), please do not hesitate to reach out if you have any questions or concerns!

---



Contact Us

International Journal of Science and Research (IJSR)
**Email:** editor.ijsrnet@gmail.com



Friday May 3 2024 16:36:42

Creative Commons: CC-BY | Open Access

© 2012-2024 International Journal of Science and Research (IJSR) - All Rights Reserved.

The Source Code and Contents of this Website are protected by Copyright Laws and May Not Be Reproduced, Distributed, or Transmitted in Any Form or by Any Means without the Prior Written Permission of International Journal of Science and Research (IJSR). Unauthorized Copying, Reproduction, Distribution, or Transmission of this Website's Source Code and Contents is Strictly Prohibited and May Result in Severe Legal Action.