

# Anesthetic Management in a Nonagerian Patient Undergoing Cardiopulmonary Bypass: A Case Report

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## Abstract

Nonagenarians undergoing open cardiac surgery experience a close anesthetic follow-up. A geriatric patient's anesthetic management is a challenge and experiences from different centres with increasing numbers could provide complementary insights to the survival benefit to guide treatment options. Our objective was therefore to describe our anesthetic approach in a Turkish nonagenarian undergoing cardiopulmonary bypass surgery and to use this case report as a starting point for collecting data retrospectively from the previous nonagenarian patients operated in our centre in the last 5 years.

**Keywords:** geriatric anesthesia; cardiopulmonary bypass; nonagerian patient

## Introduction

Lifetime expectancy is increasing because of improved lifestyle and facility to medical care services. With the increasing age population, the incidence of coronary artery diseases and the need for treatment with cardiopulmonary bypass graft procedure has also been increasing (1). Elderly patients have multiple other comorbidities and are at higher risk of perioperative morbidity and mortality. Because of accompanying comorbidities, the anesthetic management of these patients can be very challenging with a need of perioperative optimization and collaboration with a multidisciplinary team (2). In this case report, we present the anesthetic management of a nonagerian patient undergoing open heart surgery to emphasize the importance of an interprofessional team including anesthesiologists, surgeons, perfusionists, geriatricians, nurses in order to optimize the perioperative procedure and increase the therapeutic benefit.

## Case Presentation:

A 90-year-old male (80 kg and 172 cm) came to our hospital with exertional angina. He had been diagnosed with coronary artery disease and hypertension. He was New York Heart Class III with pulmonary thromboembolism, stage 5 chronic kidney disease requiring hemodialysis and an unilateral surrenal adenoma. He had polypharmacy including a  $\beta$ -blocker, diuretic, antihypertensive, antiarrhythmic and antipotassium agent. On physical examination, his blood pressure (BP) was 102/50 mmHg. Heart rate was 77 beats/min and SpO<sub>2</sub> was 96 % while receiving 2 l/min oxygen with a nasal cannula. The laboratory data were normal except high levels of creatinine of 4.91 mg/dL and BUN of 60 mg/dL respectively. Coronary angiography revealed occlusion of left anterior descending artery and right coronary artery and severe stenosis of the distal left circumflex and left main coronary artery. On transthoracic echocardiography, thrombus was observed at the catheter tip in the wall of right atrium. In the operating room, after verifying the electrocardiogram, BP and oxygen saturation, general

anesthesia was induced with lidocaine, propofol, vecuronium and fentanyl. The patient was intubated without any difficulties. Meanwhile right radial artery cannula was inserted to follow invasive blood pressure measurements. A quad-lumen central venous catheter was placed into the left internal jugular vein. Additionally, nasopharyngeal temperature probe, bispectral index (BIS) probe and near infrared spectroscopy (NIRS) probes were also used. BIS values were followed to keep the depth of anesthesia between 40-60. *Transesophageal echocardiography* (TEE) probe was placed. Anesthesia was maintained with a mixture of sevoflurane, air and oxygen and iv fentanyl infusion (2 mcg/kg/h). A median sternotomy was made, heparin was given and a standard cardiopulmonary bypass (CPB) with moderate systemic hypothermia (28°C- 30°C of nasopharynx temperature) was instituted. 80 minutes of cross-clamping with antegrade hypothermic Custadiol cardioplegia and 160 minutes of CPB were performed. Arterial blood gases (ABG) were within normal ranges. An additional dose of 10 mg rocuronium was administered during weaning from CPB at 37°C with vasodilator and vasopressor agents, as required. Our patient had an anamnesis of chronic kidney failure with decreased urine output. 40 mg of furosemid were given through the cardiopulmonary pump. 600 mL of water were distracted with a method of ultrafiltration and he had a total urine output of 350 mL, totally. At the end of the operation, fentanyl infusion was stopped. The patient was transferred to the cardiovascular surgery intensive care unit (ICU) with IV 1g paracetamol. A fast tract extubation was considered but since he had chronic kidney disease, sedative effect of fentanyl was prolonged. Thus, before extubation 1 mg of naloxone was administered. He was extubated at postoperative 18. hour and was discharged from the ICU 4 days later. On postoperative day 6, he was transferred to a palliative care center for further rehabilitation and care.

## Discussion

As the number of elderly patients increases, demands on resources for open cardiac surgery will likely increase as well [3]. However, there is a significant knowledge gap in guidance and information for nonagenarians undergoing cardiac surgery with respect to patient selection and perioperative care. This might be due to lacking data in intraoperative and postoperative follow-up of these patients [4].

From a technical point of view, careful preoperative selection is related to good outcome. Over years, the knowledge on physiological and pathological alterations due to anesthesia and CPB itself has advanced. The nonagenarians remain at higher risk of complications than younger patients reinforcing the need for careful patient selection, including preoperative frailty assessment [5]. Polypharmacy, slow metabolic rate, age related decline in organ functions may not manifest until the patient is stressed by events such as anesthesia and surgery. Age itself should not be a deciding factor and no cutoff age should be advocated if the patient is in general good condition [6]. In a cohort study, Weinberg et al detected zero mortality and low morbidity incidence at postoperative 6-month in nonagenarians undergoing cardiac surgery [7]. In contrast, Blanche and colleagues reported 10% mortality rate and relatively high morbidity rate in 30 urgent/emergent cardiac operations in patients >90 years studied between 1986 - 1995 [8]. The contradictory results between these two studies could be attributed to the differences in selection of patients for the procedures.

Blanche et al, reported a high incidence of supraventricular arrhythmias (70%), and prolonged intubation time (23%) as perioperative morbid events in advanced age (90 years and more). The authors also emphasized the high cost spent in nonagenarians in comparison to the octogenarians [8]. Nevertheless, recent studies have showed that the survival of patients undergoing surgery is better than that of the patients under medical treatment [9,10]. Although these patients have age related decline in organ function, it may not manifest until the patient is stressed by events such as anesthesia and surgery [7].

## Conclusion:

Finally, we believe that cardiac surgery procedures can be performed with therapeutic benefit for selected nonagenarians safely and with acceptable operative risk. After analysis of our clinical experience we suggest that with careful patient selection, comprehensive multidisciplinary care, and early involvement of perioperative physicians, reasonable outcomes can be achieved in nonagenarians undergoing open cardiac surgery.

Because of overlying comorbidities the anesthetic management of these patients can be very challenging with a need of perioperative optimization and collaboration with a multidisciplinary team.

On the basis of this experience, and previous reports, nonagenarians should not be denied for open cardiac surgery based solely on age. We believe there is a need of more reports describing anesthetic management and follow-up of nonagenarians for this type of surgery. That is why we wanted to share this successfully managed case report with our colleagues worldwide.

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