

Coronary Artery Bypass Grafting Following COVID-19 Infection: Difficulties and Challenges

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ABSTRACT

The COVID-19 pandemic has raised challenges and dilemmas to perform cardiac surgery in the patients following COVID-19 infection due to lasting adverse impacts of the disease on the lungs. A 74-years-old patient, recently infected by COVID-19, with previous myocardial infarction and multiple percutaneous coronary interventions, in-stent thrombosis to the left anterior descending artery, and low resting saturation, presented with chest pain and underwent urgent coronary artery bypass grafting. His postoperative period remained challenging due to high oxygen requirements. He had otherwise an uneventful recovery and was discharged on domiciliary oxygen, which was weaned off over three months and he continues to do well at six months of follow-up.

Keywords: Cardiac surgery; COVID-19; coronary artery bypass surgery; pandemic

INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic, which was commenced in Wuhan, China, is affecting the global healthcare system.^{1,2} Many of the patients with coronary artery disease requiring surgical interventions have tested positive for COVID-19 infection or have had a lasting impact on the lungs following the COVID-19 infection. It has increased the challenges and dilemmas among surgeons about timing to perform the surgery in such patients which have probably increased mortality and morbidity.³ We present an elderly male with recent COVID-19 infection and a borderline pulmonary reserve who underwent successful coronary artery bypass grafting (CABG) without major complications.

CASE REPORT

A 74-years-old male patient with hypothyroidism, hypertension, diabetic mellitus, and a previous smoker presented to the emergency with chest discomfort. He had undergone percutaneous coronary interventions (PCI) in 2004 in the left anterior descending artery (LAD) following an anterior wall Myocardial Infarction (MI) and a repeated PCI in 2012 following in-stent thrombosis in LAD. He was infected by COVID-19 in November 2020

without the requirement for hospitalization and a recently done exercise-induced ischemia test (treadmill) was positive.

Clinical evaluation revealed occasional basilar crepitation in the lungs without any other significant findings. His oxygen saturation (SpO₂) was 88% in room air and 90-92% with 2 liters/minute of oxygen support. His chest x-ray did not reveal any gross abnormality (Figure 1) and an arterial blood gas revealed a PaO₂ of 80 mmHg and PaCO₂ of 40 mmHg with 2 liters/minute oxygen supplementation. Cardiac enzyme levels were within the normal limit. His coronary angiogram revealed lesions in all three arteries with occlusion of LAD with in-stent thrombosis. EuroSCORE II and STS risk scores were 4.08% and 3.37% respectively.

A CABG under cardiopulmonary bypass was done with a left internal mammary graft to LAD and saphenous vein graft to large first diagonal and the first obtuse marginal arteries. The right coronary artery was diffusely diseased and the posterior descending artery was small in caliber and the decision to not graft those vessels was taken. The lung recruitment maneuver was provided during the intra-operative period. The ventilator support was weaned off in 4 hours, accepting a SpO₂ of 90% with

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the support of high flow oxygen in a re-breather mask, requiring up to 15 liters/minute. With regular chest physiotherapy, bronchodilators, breathing exercises with an incentive spirometer the oxygen requirement continued to decrease over the postoperative period (SpO₂ of 85% in room air and 92% with 1-2 liters/min of oxygen supplement). He was discharged on the 9th postoperative day with the advice of domiciliary oxygen of 1-2 liters/min and was on regular follow-up (Figure 1). Over a period of 3-month, his oxygen requirement was gradually decreased. At 6 months of follow-up, he remains asymptomatic, with no oxygen supplement requirement, with a resting saturation of 90 - 95% in room air.

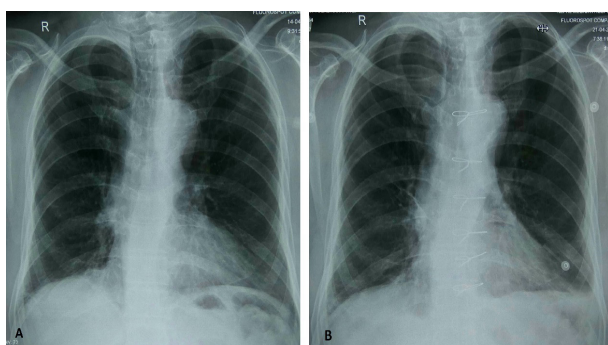


Figure 1. Preoperative (A) and Postoperative Chest X-ray (posterior-anterior view) on 6th postoperative day (B).

DISCUSSION

We present our experience of an urgent coronary artery bypass grafting in an elderly patient who had a COVID-19 infection a few months back and in-stent thrombosis of previous LAD intervention. There is a dilemma regarding the timing of the surgery for the patients who are tested positive for COVID-19 infection as the risk of surgery in COVID-19 positive patients is high. Post-COVID surgery is also challenging due to lung issues like post-COVID pneumonia, pneumothorax, and decreased respiratory reserve. The cardiopulmonary bypass and COVID-19 infection itself may exacerbate the systemic inflammatory response syndrome according to the “two-hit” model that may lead to acute lung injury.⁴ We optimized our patient and improved the lung function with intraoperative lung recruitment maneuver and postoperative regular chest physiotherapy and incentive spirometry which resulted in an uneventful postoperative period without major pulmonary complications.

Although not validated completely due to lack of sufficient data, it is recommended that cardiac surgery should be deferred where possible until the patient tests

negative due to a significant association of morbidity and mortality.⁵ The timing of surgery has been recommended once inflammatory markers normalize and the patient is tested negative. Some recommend performing the surgery at least 2 months following infection. Some have individualized that the timing of surgery should be based on the normalization of respiratory parameters.^{6,7} However, in our patient, although the resting saturation remained low, we performed the surgery as the patient had unstable angina, and chest x-ray, ABG, and other preoperative evaluation findings were normal.

During the COVID-19 pandemic, there is a drastic decrease in cardiac evaluation procedures and thus surgical procedures as well.⁶ A survey conducted during the peak of the COVID-19 pandemic that included more than 60 cardiac surgery centers and more than 600 cardiac surgeons reported about a 50% to 75% reduction in cardiac surgery case volume, 5% of centers did not perform any cardiac surgery, and one-third of centers reported more than 50% reductions in an intensive care capacity.⁵ The risk of mortality in 5864 patients waiting for elective or emergency CABG in Sweden has increased by 11% per month.⁸ Thus a judicious mechanism to identify patients requiring cardiac surgical procedures during the pandemic is necessary to prevent morbidity and mortality.

The left main stem disease, atrial fibrillation, decreased ejection fraction, and unstable angina is considered the risk factors for mortality among patients awaiting coronary bypass.⁶ Our patient had post-MI unstable angina, hence, considering the increased morbidity and mortality rate among patients awaiting cardiac surgery, we decided to perform the procedure. Further, there is an increased risk of acute kidney injury, stroke, acute respiratory distress syndrome, etc. following coronary bypass in post-COVID patients compared to non-COVID affected patients.⁹ Fortunately our patient did not have any such complications.

CONCLUSIONS

Coronary artery bypass grafting may be done with caution in patients who have had previous COVID-19 infection affecting pulmonary reserve. A judicious approach of pre-operative assessment along with post-surgical pulmonary rehabilitation may result in improved outcomes.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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