Case Report

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Combined Coronary Artery Bypass Grafting and Aortic Valve Replacement in a Patient with Severe Aortic Stenosis and Multiple Preoperative Comorbidities

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ABSTRACT

An optimal preoperative evaluation is vital to the assessment of all patients undergoing cardiac surgery. We report a case of a male patient who undertook an aortic valve replacement and CABG with preoperative determined liver solid lesion and previous right nephrectomy. All laboratory results presented that liver function and kidney function were acceptable for further cardiac catheterization and surgery. The patient went through a successful cardiac surgical treatment with uneventful weaning from CPB. The patient's postoperative course was ordinary, without complications, such as acute kidney injury, hepatic failure, or respiratory failure.

Keywords: CABG; Aortic Valve Replacement; Heart Failure; Nephrectomy; Liver Disease; Chronic Lung Disease

Abbreviations: CABG: Coronary Artery Bypass Grafting; CPB: Cardiopulmonary Bypass; GFR: Glomerular Filtration Rate; EF: Ejection Fraction; CT: Computer Tomography; MI: Myocardial Infarctions; FVC: Forced Vital Capacity; TTE: Transthoracic Echocardiogram; LAD: Left Anterior Descending

Introduction

Multiple preoperative comorbidities such as renal failure, hepatic disease, pulmonary disease, or a combination of them are rare cases [1] in patients with heart failure. Nevertheless, the number of these clinical cases is growing up. A particular opinion on how to manage these patients do not exist. Our case demonstrated that a previous full examination of the patient with cooperative work with multidisciplinary medical practitioners can ensure a safe effective cardiac surgical treatment with a low risk of postoperative complications and increased mortality.

Case Presentation

A 71-year old patient, with a previous right nephrectomy because of renal cell carcinoma in 2017. Before hospitalization at Amosov National Institute of Cardiovascular Surgery the Computer Tomography (CT) revealed a solid liver lesion. The patient had a medical history of Myocardial Infarctions (MI), as the patient was admitted for further PCI of LAD in 2014 and LCX in 2015. His medical history either included diabetes mellitus, chronic obstructive lung

disease, congestive heart failure (NYHA III class), hypertension, a smoking habit, and dyslipidemia as cardiovascular risk factors. Preoperative physical examination showed blood pressure was 140/100 mmHg, pulse rate was 61 beats per min. Preoperative spirometry examination disclosed Forced Vital Capacity (FVC), which was 43%, and decreased forced expiratory volume in 1 second (FEV1), which was 49%. Preoperative laboratory blood examination showed: Creatinine 148 μmol/L, Bilirubin 21 μmol/L, Urea 4,6 μmol/L, AST 35 U/L, ALT 51 U/L. A calculated GFR was 43 ml/min/1.73 m^2 which relate to G3b stage of chronic kidney disease.

Preoperative Transthoracic Echocardiogram (TTE) demonstrated a presence of severe aortic valve stenosis with high mean gradient and heavy calcinosis (ΔP mean = 78 mm Hg), low EF (40%), mild mitral and tricuspid regurgitation, and enlarged left atrium diameter (46 mm). Cardiac catheterization revealed multivessel coronary artery disease: stenosis of the Left Anterior Descending (LAD) coronary artery (95%), proximal portion of left circumflex (LCX) coronary artery (75%), diagonal (DIA) coronary artery (90%) and Right Coronary Artery (RCA) (70%). After these findings, he underwent aortic valve replacement and coronary artery bypass grafting (CABG). The patient was anesthetized. Cardiopulmonary bypass (CPB) was established through aortic and bicaval cannulation, and the heart was arrested using cold crystalloid cardioplegia. Three coronary arteries (LAD, Mg II, RPD) were bypassed by veins and the aortic valve was replaced by a mechanical valve On-X 25 mm. The aortic cross-clamp time was 183 min, and the duration of CPB was 287 min. Weaning from CPB was uneventful. The patient was extubated on the ninth postoperative hour. The average intensive care unit length of stay was 7 days.

Postoperative laboratory blood examination showed that creatinine level become less from 148 μmol/L to 120 μmol/L. And a calculated GFR became better from 43 ml/min/1.73 m^2 to 56 ml/min/1.73 m^2 which relate to G3a stage of chronic kidney disease. This data demonstrate that acute kidney injury was not determined due to the patient's hospital stay. Bilirubin 20 μmol/L, Urea 4,3 μmol/L, AST 31 U/L, ALT 48 U/L. Respiratory failure was not too established. Postoperative spirometry examination betrayed FVC, which increased from 43% to 74%, and FEV1, which increased from 49% to 54%. Postoperative TTE demonstrated increasing EF from 40% to 50%, mean gradient on the aortic valve 8 mmHg.

Discussion

Concomitant diseases are common in our group of patients and require a multidisciplinary approach. Comorbid conditions in patients with heart disease complicate the healing process. According to the literature, almost 65% of patients have hypertension, 30% have diabetes mellitus, 20% have chronic lung disease, about 4% have cancer, and 1.5% have chronic kidney disease [1]. Our patient has a history of nephrectomy, which is a common cause of acute kidney damage and is associated with an increased risk of chronic kidney disease [2]. Surgical mortality is known to increase with a decrease in GFR, ranging from 1.3% for GFR> 90 ml/min to 9.3% for severe renal dysfunction and up to 9% in dialysis-dependent patients [3]. The postoperative period is difficult for this type of patient. Thus, the presence of COPD in our patients, according to Zhao H. and colleagues, is a factor that increases the risk of postoperative pneumonia, acute respiratory failure, renal failure, and wound infection [4]. In addition, a liver disease also poses a risk of postoperative complications and increased mortality [5]. These data indicate a high surgical risk in this patient, but we decided to perform surgery for further surgical treatment of concomitant liver tumor.

Conclusion

The strategy of treating patients with concomitant diseases requires close collaboration between cardiovascular surgeons, nephrologists, hepatologists, and anesthesiologists. Despite the damage to many organs and systems, our data shows that cardiac surgery can be a safe first step in treating a patient without a long phase of patient preparation and waiting for the body's systems to stabilize.

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