

Case Series

Simultaneous surgery for coexisting heart disease and non-cardiac malignancy: assessment of feasibility in case series

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Abstract

We present case series of simultaneous surgery for coexisting cardiac and non-cardiac pathologies to evaluate the feasibility of the treatment. The retrospective analysis included 27 patients aged between 28 and 74 years. The most often heart diseases were coronary arterial disease and valve defects, and the most often heart surgery was coronary artery bypass grafting. The non-cardiac diseases included neoplasms in the abdominal cavity, urinary system, and chest organs. The average duration of surgery was 277 ± 87 minutes, blood loss 285 ± 182 ml. The in-hospital mortality was 0%, with median stay of 2 and 12 days in the intensive care unit (ICU) and emergency room, respectively. The 1 and 5-year survival rates were 85.7% and 76.2%, respectively. Simultaneous surgeries can be a treatment of choice for patients with cardiac pathology and concomitant neoplasm in abdominal, thoracic, or urinary system. This is the first such study conducted in the Central-Asian region and, in particular, in Kazakhstan.

Keywords: simultaneous surgery; coronary artery disease; valve disease; neoplasms

Introduction

The first article describing simultaneous cardiac surgery with pulmonary resection in patients with lung carcinoma dates back to 1998 [1]. Currently, significant progress in surgical technology has made it possible to perform simultaneous surgeries on such patients and large number of papers has been published on the topic. However, due to the wide variety of pathologies, the individual characteristics of patients, and different surgical techniques, almost all information is provided as the description of individual cases. A small number of papers describe case series, mainly cardiac pathologies and diseases of one anatomical group (thoracic or abdominal). In addition, in some regions like Central Asia there is the lack of information about the successful simultaneous surgical treatment in the case of combined pathologies.

In the present paper, we describe a case series of 27 patients, mostly with various benign/malignant tumors, who underwent simultaneous surgery in our center. The feasibility and outcomes of the simultaneous cardiac surgery and non-cardiac surgical treatment are discussed.

Case series

The local Ethics Committee approved this retrospective study. All patients were informed about the purpose of the study and signed informed consent. Twenty seven patients (8 women and 19 men) with coexisting cardiac and non-cardiac pathologies (most often – malignancies) underwent simultaneous surgery in 2012–2022. The average age was 61.6 ± 10.2 years (min. 28, max. 74). The details of patient and simultaneous surgery were extracted from their medical records; data are presented either in mean \pm S.D. or as median value, with minimal and maximal values indicated if necessary. The patients (or their relatives) were surveyed by telephone calls to obtain the following information: actual general condition at the time of the interview, preceding complaints and/or diagnosed complications during the period between surgery and the interview, or claimed death of a patient before the interview was being conducted. Long-term follow up included 1 month, 1 year, 3 years, and 5 years, the survival rates were calculated by Kaplan–Meier survival function. The detailed structure of the case series, including patient-

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specific cardiac/non-cardiac diagnoses, comorbidities, types and sequence of cardiac/non-cardiac surgical treatments, histological findings, as well as treatment-related data like total duration, blood loss, stay in the ICU/surgical ward, are presented in [Supplementary Table S1](#).

Thirteen of 27 patients were diagnosed with malignant neoplasms: lung (squamous cell carcinoma, adenocarcinoma), mediastinum (two teratoblastomas), gastrointestinal tract (five adenocarcinomas), kidneys and adrenal glands (three renal cell carcinomas, pheochromocytoma). Benign tumors were confirmed in eight patients: three hamartochondromas, hamartoma, tubular adenoma, thymolipoma, lipoma, acinar adenoma. In seven patients, non-oncological diagnoses were confirmed: three pulmonary bullae, three tuberculomas, splenic abscesses.

The surgery types included 'heart and lungs', 'heart and mediastinum', 'heart and chest', and 'heart and abdominal cavity'. In most of the patients (17 out of 27), coronary artery bypass grafting (CABG) was used together with secondary surgical treatment, while eight patients underwent valve replacement (please see details in [Supplementary Table S1](#)).

In 17 of 27 cases, cardiac surgery preceded non-cardiac surgery. Some patients ($n=17$) underwent CABG, of which one additionally underwent mitral valve annuloplasty, three underwent valve replacement, and one underwent Bentall de Bono surgery. Nine patients received treatment for heart valve pathologies during cardiac surgery stage. There were aortic valve replacements (three cases), Bentall de Bono operations (two), BioBentall operations including additional mitral valve replacement (two), mitral valve annuloplasty (one), tricuspid valve repair with interatrial septum repair (one). In one patient, the muscular bridge of the left anterior descending artery was excised. Six cardiac surgeries were performed off-pump: CABG + nephroureterectomy (one), CABG + gastric resection (one), and CABG + lung resection (four).

Heart and chest: median sternotomy was performed in 15 of 16 patients. Both stages of the operation were performed from one access. One patient underwent right thoracotomy due to the anatomical location of the pathology (decortication).

Heart and abdominal cavity: median sternotomy for the cardiac surgical stage and three cases of laparoscopy (abdominoperineal extirpation, anterior rectal resection, adrenalectomy), five laparotomies (two gastrectomies, splenectomy with corporeo caudal resection, corporeo caudal resection with splenectomy, sigmoidectomy).

Heart and urinary system: two laparotomies (nephroureterectomy), one laparoscopy (nephroureterectomy). One of the patients (laparotomy) after performing the second stage underwent re-sternotomy due to bleeding.

The average duration of surgery was 277 ± 87 minutes (min. 147, max. 470 minutes). The average blood loss was 285 ± 182 ml (min. 100, max. 1000 ml). The in-hospital mortality rate was 0%. All patients were discharged in satisfactory condition with recommendations for further treatment or observation. In one patient during the surgery (second stage), a heavy flow of hemorrhagic bleeding was observed through the drains from the anterior mediastinum and pericardium (about 700 ml, with total bleeding of 1000 ml, see [Supplementary Table S1](#), patient #26). In the postoperative period, one patient developed a pancreatic fistula (patient #21), one patient had a superficial wound infection (patient #19), and one patient experienced paroxysmal atrial fibrillation (patient #11). All cases were treated conservatively and no additional surgical intervention was required. The median stay

in the ICU was 2 days (min. 1 day, max. 13 days), in emergency room—12 days (min. 5, max. 29 days).

Out of 27 patients, one patient died due to gastric bleeding (1 month after the surgery), one patient died due to lung cancer progression (15 months), one patient died due to the complications of chronic obstructive pulmonary disease (21 months), one patient died due to dilated cardiomyopathy (34 months), and one patient died due to mediastinum cancer progression (45 months). The survival rates were evaluated by Kaplan–Meier survival function. The survival rates were as follows: 85.7% for 1-year survival rate, 81.0% for 3-year survival rate, and 76.2% for 5-year survival rate.

Discussion

Until recent years, cardiac surgery combined with simultaneous surgery for non-cardiac disease (e.g. cancer) was rather a rare treatment. Now, the combined surgery mostly includes cardiac surgery with pulmonary lung excision [2, 3] or esophagectomy [4, 5] but less often it includes heart surgery + gastrectomy [6] or heart surgery + various cancer pathologies [7]. In our present clinical study, we summarize the outcomes of combined simultaneous cardiac and non-cardiac surgeries made in our center.

There are some risks/complications of the simultaneous surgery approach, e.g. longer duration of the surgery, longer rehabilitation time, more pain suffering to the patient due to multiple surgical wounds. Also, complication after first surgery can lead to complications in the second surgery. On the other hand, when one operation is performed first and another after rehabilitation, the patient must receive general anesthesia twice, and the total duration of rehabilitation increases. If non-cancer treatment is first, it increases the risk of metastasis during rehabilitation [8] but if oncological surgery is first, the risk of complications from the cardiovascular system increases. However, the summarized data from numerous clinical studies showed that combined heart surgery and lung tumor resection results in a relatively low mortality rate and provides an acceptable complication rate [2]. Simultaneous surgery on the heart and chest cavity organs has some advantages: the ability to perform both stages through one incision and relative ease of access. In our study, the first surgery was always on the chest organs followed by cardiac surgery because this is effective, oncological and functional safe treatment [9].

Our results are in good accordance with similar clinical studies [3, 5, 7]. In the future, it is necessary for proper statistical outcome to extend our current sample of patients to those with other forms of benign/malignant tumors—this allows statistical comparison of concomitant surgeries for cardiac diseases combined with certain types of tumors.

The main limitation of our case series is that the range of cardiac and non-cardiac pathologies, as well as the comorbidities of the patients, was wide enough to hinder performing comparison of outcomes and complications between various combinations of pathologies. Another limitation of our retrospective study is that we were unable to gather large sets of information about patients suffered from heart diseases with concomitant malignant neoplasms. In the East-Asian region, there is no registry specifically focused on the patients subjected to simultaneous surgical procedures. However, despite the limitations, the results of our study support good applicability of simultaneous surgery as the method of choice even for older patients.

Conclusions

Simultaneous surgeries can be a treatment of choice for selected patients. In our study, we analyzed patients with cardiac pathology and concomitant abdominal, thoracic, or urinary system disease. These included malignant neoplasms, benign tumors, and infectious diseases. We demonstrate that patients with all these pathologies and concomitant heart pathologies can be effectively and safely treated simultaneously. However, such patients should be selected carefully according to their personal diagnostic history to fit to simultaneous surgeries with as little contraindications and complications as possible.

Supplementary Material

Supplementary material is available at Journal of Surgical Case Reports Journal online.

Conflict of interests

The authors declare no conflicts of interest in this work.

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