Early and Long Term Results of Our Open Heart Surgical Operations in the Presence of Active Oncological Diseases

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ABSTRACT

Introduction: Active cancer and heart disease, which share similar environmental and biological characteristics, can occur concomitantly. Open heart surgery may be required for these patients when indicated. This study aims to demonstrate the early and long-term results and discuss the intervention strategy in patients with different types of active malignancies, who underwent open-heart surgery.

Patients and Methods: Between January 2012 and May 2020, open-heart surgery was performed on 10 patients with active malignancies. The mean age was 65.5 (52-77), and four of the patients were female. Two patients were operated on urgently due to advanced pleural effusion. AVR+CABG, CABG, CABG+left upper lobectomy, and AVR+MVR were performed in four patients with lung cancer; AVR+CABG were performed in one patient with colon cancer; CABG was performed in four patients each with one of the following conditions: lymphoma, breast cancer, essential thrombocytosis, meningioma); and mass resection operation from the left atrium and left ventricle was performed in one patient with osteosarcoma.

Results: Eight patients were discharged and two patients died in the early postoperative period. Postoperative left hemiparesis developed in one patient. Six-month, one-year and five-year survival rates were 79%, 37.5% and 25%, respectively.

Conclusion: Open-heart surgery can be successfully performed with acceptable mortality and morbidity rates on the high-risk patient group with active cancer.

Key Words: Coronary artery bypass grafting; cardiopulmonary bypass; lung cancer; breast cancer

Aktif Onkolojik Hastalıkların Varlığında Açık Kalp Ameliyatlarımızın Erken ve Uzun Dönem Sonuçları

ÖZET

Giriş: Benzer çevresel ve biyolojik özellikleri paylaşan aktif kanser ve kalp hastalığı eş zamanlı olarak karşımıza çıkabilir. Bu hastalara gerekli endikasyonlarda açık kalp ameliyatı yapılması gerekli olabilir. Bu çalışmanın amacı, farklı tip aktif malignitelerde açık kalp cerrahisi yapılan hastalarda, erken ve uzun dönem sonuçları göstermek ve girişimi stratejisini tartışmaktır.

Hastalar ve Yöntem: Ocak 2012 ile Mayıs 2020 tarihleri arasında aktif maligintesi olan 10 hastaya açık kalp ameliyatı yapıldı. Ortalama yaş 65.5 (52-77) idi ve hastaların 4'ü kadındı. İki hasta ileri pleural efüzyon nedeniyle acil koşullarda opere edildi. Akciğer kanserli dört hastaya AVR+CABG, CABG, CABG+sol üst lobektomi ve AVR+MVR; kolon kanserli bir hastaya AVR+CABG; lenfoma, meme kanseri, esansiyel trombositoz ve meninjiyomalı birer hastaya CABG; osteosarkomlu bir hastaya da sol atriyum ve sol ventrikülden kitle rezeksiyonu operasyonları yapıldı. Aşamalı girişim olarak meme kanserli hastaya modifiye radikal mastektomi, meninjiyomalı hastaya meninjiyektomi, kolon kanserli hastaya sigmoid kolon rezeksiyonu yapıldı.

Bulgular: Sekiz hasta taburcu edildi, iki hasta postoperatif erken dönemde kaybedildi. Bir hastada postoperatif önemde sol hemiparezi gelişti. Altı aylık, bir yıllık ve beş yıllık yaşamda kalım oranları sırasıyla; %79, %37.5 ve %25 olarak saptandı.

Sonuç: Açık kalp cerrahisi, aktif kanser varlığında yüksek riskli hasta grubu için kabul edilebilir mortalite ve morbidite oranlarıyla başarıyla yapılabilmektedir.

Anahtar Kelimeler: Koroner arter baypas greftleme; kardiyopulmoner baypas; akciğer kanseri; meme kanseri

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INTRODUCTION

Heart diseases and cancer are conditions that carry similar environmental and genetic risk factors[1,2]. In the clinical setting, both conditions can be encountered concomitantly in the same patient[3]. Invasive cardiological intervention and open-heart surgery may also be necessary in the presence of both active malignancy and heart disease. Coronary artery stenting[4], coronary artery bypass grafting surgery (CABG)[5,6], valve surgery[6,7], and with increasing rates in recent years TAVI (transaortic valve implantation)[8] are performed in many different types of cancer, where appropriate.

In this study, we presented 10 patients with active malignancies who underwent open-heart surgery between 2012 and 2021. We aimed to be a guide for similar situations by addressing the early and late results.

PATIENTS and METHODS

Between January 2012 and July 2021, 10 patients with heart disease and concurrent active malignancy were operated on. The mean age was 65.5 ± 7.8 (52-77), and four of the patients were female. Among these patients four had lung cancer, one had breast cancer, one had colon cancer, one had lymphoma, one had osteosarcoma, one had meningioma, and one had thrombocytosis (Table 1).

Some of the patients were hospitalized due to myocardial infarction, angina, or other cardiac findings and complaints, before the diagnosis of a malignancy. On the contrary, a group of patients was diagnosed with heart disease after they were diagnosed with malignancy or while they were on treatment.

Six out of 10 patients were in Stage 3-4, the advanced stage. The diagnosis of malignancy was confirmed histopathologically by biopsy in nine patients (Table 1). In the tenth patient, sequential platelet counts were 765.000 and 875.000 in the preoperative hemogram. After a hematology consultation, the patient was diagnosed with essential thrombocytosis. In this patient, platelet counts increased up to 1.099.000 and 1.309.000 on the 8th and 10th postoperative days.

Written informed consent was obtained from all the patients before the operations. The study protocol was approved by the Clinical Research Ethics Committee (2020/13/395, December 8, 2020).

All operations were performed under cardiopulmonary bypass and cardioplegic arrest conditions. Eight of the patients were operated on as electively. Two patients were operated on urgently with advanced pleural effusion.

Four patients were operated on with the diagnosis of lung cancer. Three of them were elective and one was urgent. Iso-

Table 1. Patients'age, gender, cardiac and malignity diagnosis, surgical procedures, pathologic diagnosis, and operative conditions

	Age	Cardiac Disease	Malignancy	Surgical Procedures	Histopathological Diagnosis	Condition
1	69-W	CAD	Breast Tumor	Modified radical mastectomy, later on CABGX2	Invasive ductal carcinoma	Elective
2	61-M	CAD, AS	Sigmoid Colon Tumor	CABGX1+AVR, later on sigmoid colon resection	Moderately differentiated adeno ca	Elective
3	77-M	CAD	Essential Thrombocythemia	CABGX3	None	Elective
4	72-W	CAD	Intradural Tumor	Meningioma resection, later on CABGX3	Meningioma	Elective
5	73-M	CAD, AS	Lung Tumor	CABGX2 + AVR	Squamose cell ca	Elective
6	61-M	CAD	Lung Tumor	CABGX4	Non-small cell ca	Elective
7	69-W	CAD	Lymphoma Previous Kidney Cancer Operation	CABGX3	Metastatic adenocarsinoma	Elective
8	57-M	CAD, MS, AS	Lung Tumor	LAD PCI, later on AVR + MVR	Non-small cell ca	Urgent
9	64-M	CAD	Lung Tumor	Combined CABGX3 + left lower lung lobectomy	Non-small cell ca	Elective
10	52-F	Cardiac metastatic masses	Tibial Bone Tumor	Left atrial and left ventricular mass resection	Undifferentiated sarcoma metastasis	Urgent

CAD: Coronary artery disease, CABG: Coronary artery bypass grafting, AS: Aortic stenosis, AVR: Aortic valve replacement, MS: Mitral stenosis, MVR: Mitral valve replacement.

lated CABG, CABG+AVR (aortic valve replacement), and CABG+left lower lobectomy were performed in three elective patients. The fourth patient was an urgent case and was receiving chemoradiotherapy in an external center. He presented with marked dyspnea and pulmonary edema in the right hemithorax possibly due to both heart valve disease and advanced stages of lung malignancies. There was no hemodynamic deterioration. Echocardiography revealed advanced aortic stenosis and advanced mitral stenosis. A percutaneous intervention was successfully performed on the critical LAD (left anterior descending) lesion detected on the coronary angiography. Afterwards, mechanical valve and AVR+MVR (mitral valve replacement) were performed on the patient.

The fifth patient, who was also operated on urgently for osteosarcoma and intracardiac metastatic masses, had received chemotherapy. She was operated on urgently because of a large mass in the left atrium and left ventricle, and severe dyspnea due to significant pleural effusion related to the advanced stage of malignancy. Inotropic agents had to be started for hemodynamic stabilization before the patient was taken to the operation.

CABG+AVR was performed on the sixth patient with colon cancer who underwent elective surgery, and a colectomy was performed one month later. Modified right radical mastectomy was performed in the seventh patient with breast cancer, and isolated CABG was performed one month later. The eighth patient with meningioma suffered myocardial infarction while being followed up in the neurosurgery service after meningiectomy; isolated CABG was performed on the patient who was referred to surgery. Isolated CABG was performed in the ninth patient with essential thrombocytosis and the tenth patient with lymphoma.

RESULTS

Eight of our 10 patients were discharged. There were no major complications in seven of the eight discharged patients. Postoperative renal replacement therapy was required in the patient who was operated on urgently for osteosarcoma. Her acute renal failure resolved. Right hemiparesis developed in this patient during follow-up in the unit. She was transferred to the oncology clinic for physical therapy and a new course of chemotherapy. Superficial sternal incisional discharge was observed in the patient with meningioma, and it recovered in a short time with appropriate treatment.

Two of our patients who were operated on for lung cancer and underwent CABG+AVR and left upper lobectomy+CABG died on the 10th and 5th days, respectively, due to low cardiac output.

Our patients were followed up by oncology clinics after discharge. Two of our patients with lung cancer survived for seven months and eight months after surgery. The patient with essential thrombocytosis and the patient with colon cancer survived for 1.5 years after the operation. The patient with meningioma is in the 4th year. Our breast cancer patient died in the 8th year. The patient with osteosarcoma is alive in the 3rd postoperative month.

The 1-year survival rates for all patients are 79% for 6 months, 37% for 1-year, and 25% for 5-years (Figure 1).

DISCUSSION

Our early and mid-term results show that surgical treatment can be performed in this high-risk patient group.

In active cancer, the decision of performing an open heart surgery is often made on a patient-by-patient basis. Surgeries are usually performed in Stage one and two groups of patients[9]. However, the presence of an advanced tumor is not an obstacle to open-heart surgery. It was reported that 61 of 241 patients who underwent open-heart surgery in the presence of malignancy had Stage 3-4 advanced stage solid organ tumors and more than one organ involvement for hematological cancers[10]. In another study discussing aortic valve intervention and malignancy together, it was reported that 13.7% of 614 patients who underwent isolated AVR had metastasis[11]. Our six patients; four with lung cancer, one with lymphoma, and one with osteosarcoma, were in advanced stages. Four of them were discharged. We lost two of our patients who had lung cancer. We think that if percutaneous intervention and/or TAVI cannot be performed, the surgical option should not be excluded in this advanced stage patient group which can be advanced symptomatic with fluid accumulation in the lung and which may benefit from surgery.

The results are closely related to whether the malignancy is advanced or elective. In a series of 241 cases in which purely elective cases were included, early mortality was 5.8%[10], and it was found as 14.3% in a study involving 28 patients with only hematological cancers, including emergency cases[12]. In cases with advanced cancer, surgical intervention is recommended in cases where the cardiac problem precedes the oncological problem clinically[9]. As far as we know, considering the total number of cases, there is no study in the literature in which the number of advanced and emergency cases is higher than the early-stage cases. Six of our ten patients were in the advanced stage. Cardiac problems preceded the oncological problems in all six of the advanced-stage patients. We believe that taking the high risk into account, surgical treatment should be applied in cases where the clinical condition of the patient is good, and TAVI and percutaneous coronary procedures cannot be performed.

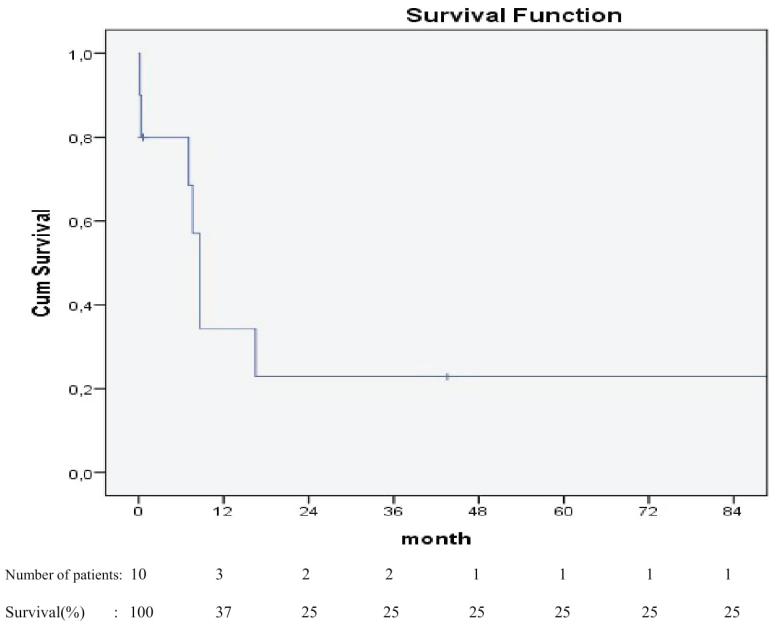

Figure 1. Survival as a function of years after the operation. Numbers and the percentageas in the figure represent the number of patients and the percentages of respective survival over parallel years of follow-up.

There is no objective evidence that cardiopulmonary bypass affects the spread of active cancer. The opinion that extracorporeal circulation will not cause a cancer-related negative effect in the early period[9,12] and long-term[9,13] predominates. Postoperative bleeding and infection complications[14] and the possibility of blood transfusion have been reported to increase [15]. However, neither in these publications[9,12-15] nor in any of the publications in the literature that we could reach, there is a mention of a finding that cardiopulmonary bypass increases tumor dissemination.

The rate of patients with active cancer in the entire patient population undergoing cardiovascular intervention can be considered quite low, with rates of 2.5% for cardiac surgery[9] and 1.8% for percutaneous intervention[16]. Considering the multiplicity of clinical scenarios, these low incidence rates make treatment protocols more diverse and complex. Therefore, case-based decision-making becomes even more important. In a study comparing TAVI and surgical AVR in patients with active cancer, similar early mortality rates were observed for both interventions, and TAVI had better results in the early period, especially in terms of thromboembolic events[11]. In coronary revascularization in lung cancer, PCI in 1-2 vessel disease and surgery in 2-3 vessels are considered[17]. All six patients in whom we performed isolated CABG were triple-vessel disease patients. The percutaneous intervention was not considered appropriate in our four patients with cardiac mass, valve+coronary disease, and double valve replacement. The close cooperation of cardiology, cardiovascular surgery, oncology, and other related surgical branches will enable the most accurate decision to be made in terms of early-term mortality risk and contribution to the long-term survival of these cases.

The low number of patients is one of the limitations of our study, which makes it challenging to generalize the treatment in certain types of malignancies and accompanying heart diseases. On the other hand, international guidelines regarding the open-heart surgery in the presence of active oncological disease have not been created. Yet, making patient-based decisions in such situations becomes even more important due to the severity of both diseases.

In conclusion, we believe that in active cancer cases, an open-heart surgery can be performed in multi-vessel disease where percutaneous intervention is not appropriate, in combined aortic stenosis and coronary artery disease where TAVI and percutaneous intervention are not considered, and when two valve replacement is required. We believe that the high risk should not be a reason to exclude surgery in the coexistence of two conditions where very different clinical scenarios might occur.

Ethics Committee Approval: The approval for this study was obtained from Kartal Koşuyolu High Training and Research Hospital Clinical Research Ethics Committee (Decision no: 2020/13/395, Date: 18.12.2020).

Informed Consent: This is retrospective study, we could not obtain written informed consent from the participants.

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