Our surgical approach to the high risk left main coronary artery stenosis in a case who received irradiation due to malignancies of two separate systems

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Citation

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Abstract

Radiation-induced heart disease is a well-known complication but rare entity.In this study we present our surgical approach to the high risk left main coronary artery stenosis in a case who received irradiation due to malignancies of two separate systems.Surgical revascularization of the coronary lesions has good long-term results.

INTRODUCTION

Isolated left main coronary artery stenosis induced by mediastinal radiation is a well-documented but rare entity. Its clinical manifestations can be latent for many years, but its ominous sequela cannot be ignored (1). Therapeutic irradiation results in the inadvertent inclusion of the heart within the irradiation field. Over the next 10 to 20 years, some of these people may experience pathological changes of the heart valves , accelerated atherosclerosis of the coronary artery that heightens their risk of experiencing a fatal myocardial infarction or both (2). Previous radiotherapy should be considered as a risk factor for the development of premature coronary artery disease. Percutaneous transluminal coronary angioplasty with stent placement or surgical revascularization is the preferred methods of treatment (3).

CASE PRESENTATION

Our case was a 76-year-old female. She was suffering from chest pain for 15 days. Investigations revealed increase in cardiac enzymes and she was then referred to catheterization laboratory for emergent coronary angiography. Transthoracic ehocardiography showed a left ventricular end-systolic diameter of 52 mm and end-diastolic diameter of 59 mm. Left ventricular ejection fraction was 25%. Coronary angiography showed a left main stenosis of 85% and a stenosis of 20% in left anterior descending artery with plaque formation in the circumflex artery (Figure 1).

Figure 1

Figure 1

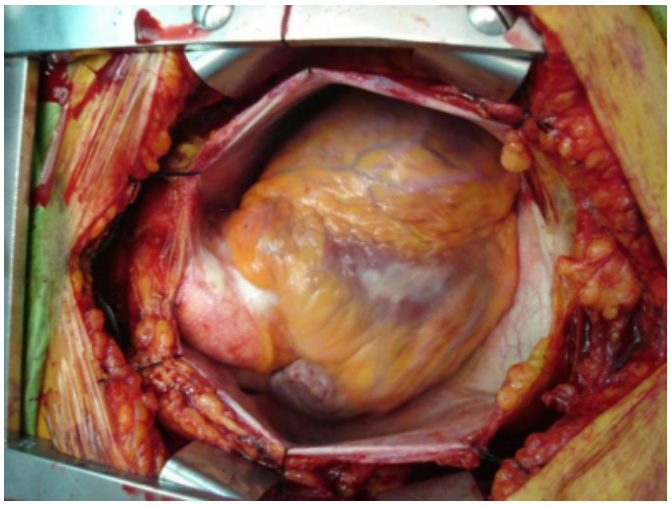
It also confirmed the ejection fraction as 25-30%. Her past medical history was significant for type 2 diabetes that was regulated with insulin, hypertension, Hodgkin lymphoma that was diagnosed 8 years ago (located at right subclavian and neck area) and carcinoma of cervix that was diagnosed 5 years ago. She stated that she received separate radiotherapy sequences for both malignancies.

Our case was taken into operating room with these findings.

Following a median sternotomy,pericardium was opened longitudinally. Scar tissues were observed on right ventricle and aorticopulmonary localization (Figure 2).

Figure 2

Figure 2



After heparinization, extra-corporeal circulation was established between the venae cavae and the ascending aorta. A cross clamp was placed on aorta and by antegrade intermittent isothermic blood cardioplegia from aortic root,cardiac arrest was established. Continuous retrograde isothermic blood cardioplegia was performed. Hypothermia was moderate (29ºc). The right great saphenous vein was prepared for venous graft and distal anastomoses to left anterior descending and second obtuse marginal arteries were completed. Proximal anastomoses were performed with side clamp. She didn't have additional problem and she was discharged home with surgical success and without any cardiac complications at 9th day. After the operation, she was free from symptoms.

DISCUSSION

With the increasing population of patients with prior mediastinal irradiation, cardiac surgeons will encounter patients with radiation-induced damage to the heart and the great vessels (4).

Radiation can affect all the structures in the heart, including the pericardium, the myocardium, the valves and the conduction system. In addition to these pathologies, coronary artery disease following mediastinal radiotherapy is the most actual cardiac pathology as it may cause cardiac emergencies requiring interventional cardiological or surgical interventions (3).

Coronary artery disease (CAD) is a well-known complication of mediastinal irradiation (5).People with Hodgkin's disease and cervix cancer often receive therapeutic irradiation as an element of treatment.

The association of mediastinal radiation therapy and coronary artery disease has been documented over the past three decades (6). In the case report of Hovland et al.; a 34-year-old woman developed chest pain during exercise. She had been treated for Hodgkin lymphoma with irradiation (mantle field) and cytotoxic drugs (ABVD) 15 years earlier, and had risk factors for coronary artery disease (smoker status and family history). Her coronary angiography showed three vessel disease (including stenosis of the left main stem); bypass grafting was successfully performed. This case illustrates the fact that development of coronary artery disease may be accelerated after irradiation of the thorax (7).

In the study of Wan et al.; they report a patient presenting 16 yr postmediastinal radiation, the longest documented latency to date (1).

In the study of Pillière et al.; they report a case of subocclusive ostial stenosis of the left main coronary artery, in a 27 years old man, who had been irradiated 14 years before for a stage 4 Hodgkin's disease. Among the 68 reported cases of CAD attributed to radiotherapy, 11 involved an ostial stenosis of either right coronary artery, or left main coronary artery or both (5).

In the study of King et al.; 475 patients were treated for Hodgkin's disease. The 326 of these patients who had mantle irradiation (RT) and survived 3 years formed the study population. Cardiac catheterization and necropsy data were reviewed to determine the presence and degree of coronary artery stenosis. Eighteen of 326 patients (5.5%) have had a morbid cardiac event directly related to coronary artery disease. Seven patients had cardiac death. Seven patients experienced nonfatal myocardial infarction, and four patients had angina pectoris. The mean interval from RT to morbid cardiac event was 13.1 years and the mean age at the time of the event was 39.4 years (8).

In conclusion; with many patients treated by radiation therapy may be susceptible to the early development of ischemic heart disease. RT is an additional risk factor in the induction of morbid cardiac events. Appropriate cardiac shielding and radiation doses, careful follow-up, which includes monitoring of cardiac function, and a preventative

program of sensible dietary habits, exercise, and nonsmoking may be beneficial in reducing cardiac morbidity in long-term (8). As the radiation therapy is currently the standard treatment for a number of malignancies, routine screening of these patients and optimal cardiac prevention during radiotherapy are the only ways to minimize the incidence of radiation-induced heart disease (3). Surgeons should be well versed in all the manifestations and the management of radiation-induced heart disease (4).

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