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Simultaneous surgery: Off-pump coronary artery bypass surgery and total pulmonectomy

Abstract

Coronary artery disease increases the morbidity of surgery in patients with lung tumors. There are still disagreements about whether to perform simultaneous surgery or in different sessions, and which surgical strategy should be chosen in these patients. We presented a 62-year-old elderly patient who underwent simultaneous coronary bypass surgery and lung tumor surgery.

Keywords: Simultaneous surgery, pulmonectomy, coronary bypass surgery

INTRODUCTION

Concomitant lung cancer and cardiovascular diseases are on the rise. Prior to cardiac surgery, lung tumors are detected incidentally via chest radiography or tomography and pose a challenge for the surgeon. Physicians sometimes avoid invasive procedures to confirm the diagnosis of lung tumors in patients with poor cardiac performance. Anticoagulant and antiagregant medications used after cardiac surgery create a risk of bleeding (1,2). At the same time, it is necessary to decide whether cardiac surgery and lung tumor surgery should be performed in the same session, which should be done first, and whether cardiopulmonary bypass should be used. We presented a 62-year-old elderly patient who underwent simultaneous coronary bypass surgery and lung tumor surgery.

CASE REPORT

The 62-year-old elderly male patient applied with chest pain. A T change in anterior derivations (V1-V4) on ECG and hypokinesia in the left ventricular anterior wall on echocardiography were detected. The patient underwent coronary angiography, and

coronary artery surgery was planned following the finding of a severe lesion of the left anterior descending artery (LAD) proximal segment (Figure 1). Echocardiography revealed an anterior wall movement abnormality of the left ventricle; however, the ejection fraction was 50%. In the chest radiograph taken during the preparation of the surgery, a lesion compatible with the mass in the left lung hilar region was observed. In thoracic CT, it was reported that there was a mass of 4x2.4x3.2 cm with pericardial invasion in the left lung hilar region, adjacent to the left atrium (Figure 2). In the bronchoscopy examination of the patient with normal cardiac performance, a biopsy was taken from the hyperemic bronchus and reported as adenocarcinoma. Pet CT revealed high FDG uptake in the anterior segment of the left lung upper lobe and in paraaortic, paraesophageal, and hilar lymph nodes, but no distant organ uptake. Neoadjuvant chemotherapy was given to the patient, and concomitant coronary surgery and a pneumonectomy were planned.

The patient was intubated with a double-lumen intubation tube under general anesthesia. A sternotomy was performed, and a left internal mammarian artery (LIMA) graft was prepared under systemic heparinization. Activated clotting time was kept above

300. Pericardial sutures were placed. LIMA-LAD anastomosis was performed with a 7/0 prolene suture in the beating heart using an octopus suction stabilizer. After neutralizing with heparin protamine sulfate, left anterior thoracotomy was performed. Excision was performed due to the pericardial invasion adjacent to the left atrium. A left pneumonectomy was performed by excising the paraaortic, paraesophageal, and hilar lymph nodes. Hemostasis was performed, mediastinum and left thoracic drains were placed. Sternotomy and thoracotomy incisions were closed. The patient was transferred to the intensive care unit with stable hemodynamics. In the postoperative period, the patient's pulmonary performance was normal, no air leakage was observed, and the patient recovered without incident. The patient didn't need a blood transfusion. He was discharged on the 7th postoperative day. At the six-month follow-up, the patient had no complaints other than mild hoarseness from the preoperative period. There were changes in the chest X-ray suitable for surgery (Figure 3).

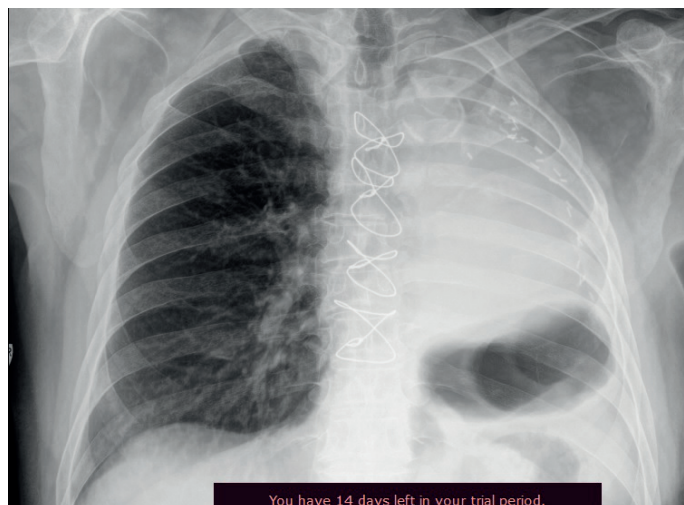


Figure 3. Postoperative lung x-ray image

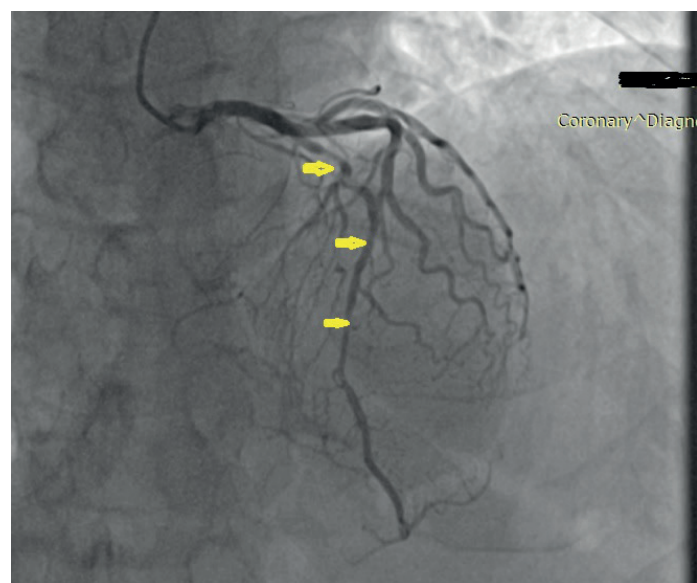


Figure 1. Proximal and long segment LAD stenosis

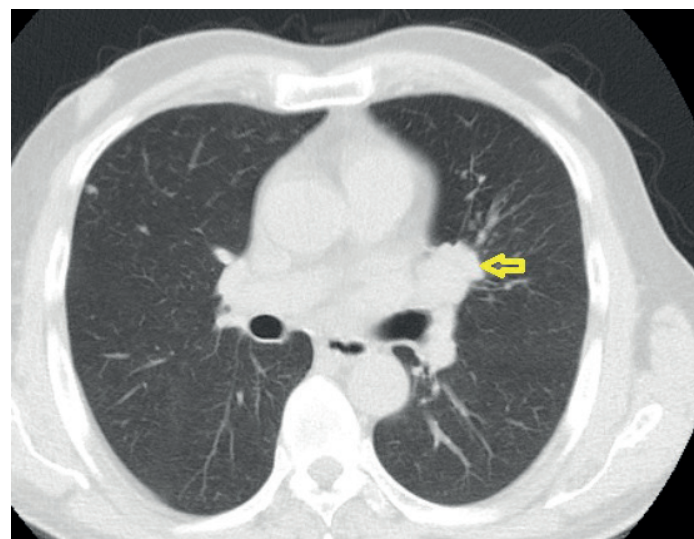


Figure 2. Tumor in the left lung hilus that invades the left atrium

DISCUSSION

The cases of incidental lung tumors detected before cardiovascular surgery pose a significant challenge for surgeons. A diagnosis of an incidental lung tumor prior to cardiac surgery is made by conventional radiological and serological examinations, which are partially useful for diagnosis (3).

There is no conclusive agreement on whether the surgical procedure should be performed in a single stage or in two stages in the treatment of lung tumors detected prior to cardiac surgery. The two-step procedure means twice the general anesthetic intake for the patient, longer hospitalization, delayed lung resection, doubling of preoperative stress and postoperative pain, and higher treatment costs. Single-stage surgery, on the other hand, increases the risk of postoperative bleeding due to heparinization and may cause technical difficulties in the exposure of the lungs (in the sternotomy approach) and in the dissection of mediastinal lymph nodes (4,5). Considering these factors, we preferred single-stage surgery for our patient.

A median sternotomy can be used in most patients, as it allows cardiac and lung surgery to be performed through a single incision. In the series of Mark et al., median sternotomy has been used in most of the patients. Compared to posterolateral thoracotomies, median sternotomies have been associated with decreased postoperative pain and analgesic requirements and faster recovery of pulmonary function. Technical problems may be encountered during the resection of a malignant lung lesion at the time of the procedure combined with the median sternotomy. In particular, left lower lobectomy and pneumonectomy are technically the most difficult pulmonary resections via median sternotomy since the dissection site tends to be obscured by the heart and retraction may cause arrhythmia and hemodynamic instability (6). Since left pneumonectomy was planned in our patient and there was left atrial invasion, we preferred the left anterior thoracotomy approach with sternotomy. As hemodynamic deteriorations are common during coronary surgery and left lower lobectomy or

pneumonectomy, it is recommended to use CPB. This allows for easier access to the left lung hilus while avoiding hemodynamic deterioration. Such patients can be treated in two stages by performing pulmonary resection with a lateral thoracotomy incision at a later stage. The alternative approach is to perform lung surgery with a separate thoracotomy incision after giving the patient the appropriate position following CABG surgery through a median sternotomy, which we preferred for protection from hemodynamic instability and good exposure in our patient.

The use of cardiopulmonary bypass (CPB) in patients requiring simultaneous cardiac and thoracic procedures can be necessary, and undesirable side effects of CPB may be seen. The use of CPB can activate SIRS, disrupt the immune response, and increase the risk of edema. Patients who undergo cardiac surgery with CPB are at significant risk for postoperative bleeding. Bleeding may be caused by excessive heparinization, inadequate heparin neutralization, or excess protamine. CABG without CPB significantly reduces postoperative bleeding and transfusion requirements (7). However, performing coronary artery surgery in the beating heart and not using CPB eliminates all the disadvantages related to the above-mentioned CPB complications. Various studies have shown many advantages of avoiding the use of CPB, such as less pulmonary dysfunction, decreased need for blood transfusion, shorter hospital and/or intensive care unit (ICU) stay, decreased incidence of postoperative atrial fibrillation, incidence of postoperative renal failure, decreased need for perioperative use of the intra-aortic balloon pump, decreased neurological incidence, immunosuppressive effects of CPB, and reduced risk of intrapulmonary bleeding after lung resection. The other concern is that cardiopulmonary bypass can cause the spread of neoplastic cells (7,8). We performed our surgery on the beating heart without using CPB.

CONCLUSION

In conclusion, we think that both surgeries can be performed safely with simultaneous procedures when lung cancers, which are incidentally detected in patients scheduled for cardiac surgery, are operable. Patients can receive oncological treatments without the need for second surgery and without delay. The use of Off-pump technique for coronary surgery provides a more comfortable tolerance of the postoperative period in such procedures.

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Patient Informed Consent: The patient was informed about his disease and surgery, and his consent was obtained that this information could be used for scientific purposes.

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