Case report

Combined left pneumonectomy and off-pump coronary artery bypass through left thoracotomy

Nawwar Al-Attar, Susanna Salvi, Uriel Sebbag, Patrick Nataf*

Department of Cardiac Surgery, Centre Cardiologique du Nord, 32-36 rue des Moulins Gémeaux, 93207 Saint-Denis CEDEX, France

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Abstract

Concomitant pneumonectomy and coronary artery bypass grafting (CABG) carry a high morbidity and mortality rate. We present the case of a patient operated on for left pneumonectomy and off pump CABG through a left thoracotomy incision in a one-stage procedure with a 1-year disease-free follow-up. To the best of our knowledge, simultaneous surgical management as presented in this patient has not been previously reported.

Keywords: Coronary artery bypass grafting; Pneumonectomy; Cardiopulmonary bypass

1. Introduction

Surgery for concomitant pulmonary and coronary disease can be performed in two stages or in a combined procedure. Most of the latter have been limited to coronary artery bypass grafting (CABG) under cardiopulmonary bypass (CPB) and lobectomy or segmentectomy [1]. We present a patient who underwent total pneumonectomy through left antero-lateral thoracotomy followed by off-pump coronary artery bypass (OPCAB) in the same surgical setting.

2. Case report

An 80 year old man with former inferior myocardial infarction and arteriopathy of the lower limbs presented with hemoptysis and chest pain. Chest X-ray showed a left spiky hilar image with atelectasis of the left lower lobe. The CT scan confirmed a left interbronchial mass impinging on the left lower lobe segmental bronchus (Fig. 1). Bronchoscopy showed complete obstruction of the left lower lobe bronchus with infringement on the lingual bronchus by a large extrinsic mass that underwent biopsy. Histopathological sections suggested an undifferentiated bronchogenic carcinoma. In the absence of evident mediastinal lymphadenopathy and systemic metastases, complete resection was decided. Respiratory function tests showed moderate non-reversible obstructive airway disease with a FEV1 of 72%. His exercise ECG test was pathological. Coronarography demonstrated multiple significant stenoses of the left anterior descending artery (LAD), 50% stenosis of obtuse marginal and occlusion of segment 2 of the right coronary arteries. The complexity of the lesions, especially on the LAD, was considered to be a contraindication for PTCA by the interventional cardiologists.

The surgical strategy was thus changed to pneumonectomy and left internal mammary artery (LIMA) to left anterior descending artery (LAD) bypass.

Through selective intubation, a left antero-lateral thoracotomy was performed in the 5th intercostal space. Exploration showed a 10 cm rounded tumour limited to the left lower lobe with small lymphnodes near the inferior pulmonary vein and bronchus. Further exploration of the mediastinum showed a couple of inter-aorto-bronchial lymph nodes. The pericardium was opened allowing access to the LAD and stapling of the right pulmonary artery, which permitted further lymph node dissection. Involvement of the inferior pulmonary vein required a cuff resection of the left atrium. Meticulosus mediastinal lymph node dissection completed the procedure and the specimen was sent for histopathological examination.

The second step consisted of harvesting the LIMA through thoracotomy. After heparinization (1 mg/kg body weight), anastomosis to LAD was performed on beating heart using an Origin® stabilizer (Origin, Guidant). Transient ventricular extrasystoles occurred during coronary clamping. Heparinization was reversed at the end of the anastomosis. A plaque of Vicryl to reflect the pericardium
was used to prevent subluxation of the heart secondary to left pneumonectomy. The patient did not receive any blood or blood products and was extubated at the 9th h and stayed in the ICU for 1 day. He developed sural phlebitis on postoperative day 8 complicated by a minor pulmonary embolism. He was put on anticoagulants and discharged on the 18th day postoperatively.

Histopathological examination revealed a small cell carcinoma extending into the upper and lower lobes with invasion of the left inferior pulmonary vein and aorto-pulmonary lymph nodes (T3N2M0). Follow-up bronchoscopy, 2 weeks later, showed a healthy looking bronchial stump and was otherwise unremarkable.

One year after surgery, the patient is asymptomatic (NYHA class I) and his chest X-rays are repeatedly normal.

3. Discussion

Although the prevalence of simultaneous coronary artery disease and lung cancer is difficult to determine and is supposedly quite low (0.3%) [2], the surgical strategy debates performing lung resection and coronary artery surgery in one or two sessions. Coronary angioplasty may be indicated in certain settings [3] but not in this patient with fairly complex lesions in whom angioplasty could not be undertaken.

Several authors [2,4] have discussed pros and cons for each surgical strategy. For a single-staged procedure, CPB may increase the risk of haemorrhagic complications; moreover, exposure to the immunosuppressive and inflammatory effects of CPB may have a deleterious effect on tumour growth and dissemination [5]. Additionally, while right thoracotomy (for right-sided tumours) offers limited coronary exposure, sternotomy may prove to be inadequate for lung resections in the right hemithorax. For right-sided tumours, some authors propose the two procedures to be separately performed: CABG through sternotomy and right pneumonectomy through a separate right thoracotomy [4].

On the other hand, the advantages of a single-staged procedure include minimising the operative and anaesthetic risks of a second operation, a shorter period of disability and reduction of hospital costs. The delay of tumour resection in a staged procedure can also be a factor of increased morbidity to the patient. Furthermore, OPCAB can be performed without much difficulty through a left thoracotomy. The use of OPCAB when the surgical setting is otherwise ideal: a left sided tumour (<T3), absence of adhesions, one or two-vessel disease, combines the merits of one-stage surgery and avoids at the same time CPB complications.

We believe that OPCAB minimizes the risk of postoperative bleeding due to the lower dose of heparin administrated (1 mg/kg BW) and by avoiding activation of the coagulation system from contact with the CPB tubing [6]. The latter may also be important in the preservation of the cellular immunity and complement, thus acting preferably in the long-term prognosis of these precarious patients.

Some authors employ sternotomy as standard approach to left sided tumours requiring CABG. They acknowledge, however, that left lower lobectomy is technically difficult requiring hazardous manipulation of the heart in an off-pump setting [2].

The contraindication of angioplasty in this particular patient pleaded for a surgical procedure. While management of the neoplasm by radiotherapy and adjuvant chemotherapy would (retrospectively) had been a valid option given the postoperative pathological diagnosis, surgery allowed the patient to benefit from an OPCAB as well as resection of the tumour with a disease-free interval of 1 year.

4. Conclusion

Operable cancer of the left lung with concomitant coronary disease non-amenable to angioplasty can be managed through left thoracotomy alone. This approach provides adequate access for lung resection as well as CABG in a single-staged procedure avoiding CPB.

References


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