

CAS CLINIQUE/CASE REPORT

COMBINED CORONARY SURGERY AND AORTIC VALVE REPLACEMENT AFTER PREVIOUS RIGHT PNEUMONECTOMY

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ABSTRACT : Cardiac surgery in patients with previous pneumonectomy is infrequently reported. We report a case of combined coronary artery bypass grafting and aortic valve replacement in a patient with left ventricular ejection fraction less than 35% and a previous right pneumonectomy. All steps in operative management of this rare condition are discussed.

INTRODUCTION

Cardiac surgery in patients with previous pneumonectomy has been infrequently reported. Published cases included coronary surgery or valvular surgery in patients with good left ventricular function. We report a case of combined coronary artery bypass grafting and aortic valve replacement in a patient with left ejection fraction less than 35% and a previous right pneumonectomy.

CASE REPORT

A 71-year-old man presented for worsening exertional dyspnea evolving for the last three years. In his past medical history, he had a right pneumonectomy 20 years ago following a motor vehicle accident. Since, he was asymptomatic and was a heavy smoker. In the last two years, he had twice a left spontaneous pneumothorax that was exsufflated. Eight months before admission, he developed acute pulmonary edema. Transthoracic echocardiogram at that time showed focal inferior dyskinesia with aortic valve stenosis. Actually the patient presented for worsening dyspnea that appeared at rest.

On physical examination, the patient was hemody-

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RÉSUMÉ : La chirurgie cardiaque chez les patients précédemment pneumonectomisés n'est pas fréquemment rapporté. Nous présentons le cas d'une chirurgie combinée de pontages coronariens et de remplacement valvulaire aortique chez un patient ayant une fraction d'éjection moins de 35%, aux antécédents de pneumonectomie droite. Toutes les étapes de prise en charge opératoire de ce cas rare sont discutées.

namically stable and the respiratory rate was 22 breaths per minute. The right thorax was silent. Respiratory crackles were heard in the lower half of the remaining lung. Accessory respiratory muscles were hypertrophied. A systolic murmur over the aortic area irradiating to the neck was heard.

EKG showed sinus bradycardia with complete left bundle branch block. Chest X-ray showed absence of the right lung with a right mediastinal shift along with a vascular redistribution in the left lung. Transthoracic echocardiogram demonstrated a dilated left ventricle with global hypokinesia with an inferior akinetic pouch. Ejection fraction was 35%. Severe aortic stenosis was shown, but the ascending aorta could not be visualized. The right ventricle was dilated, along with severe pulmonary hypertension (systolic pulmonary pressure reaching 65 mmHg) and mild functional tricuspid regurgitation. Coronary angiogram objectivated an occluded right coronary artery at its medial portion, with an ostial 90% stenosis of the second diagonal artery.

Aortic valve replacement was considered. The patient was informed about the potentially difficult respiratory complications as well as the risk of prolonged endotracheal intubation. CT-scan objectivated a post pneumonectomy status, with a right lateral-basal hydrothorax and a rightward deviation of the mediastinum and the great vessels. Preoperative arterial oxygen tension was 63 mmHg, without nasal oxygen therapy, arterial carbon dioxide tension was 42 mmHg, and arterial oxygen saturation was 95.6%. Functional respiratory tests showed 53% of predicted value (1.24 L) for forced expiratory volume in one second, 48% of predicted value (1.64 L) for forced vital capacity, with FEV 25-75% increasing by more than 20% post bronchodilator, favoring a dual syndrome but mostly a restrictive disease. No arterial

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desaturation was revealed on stress oxymetry. Respiratory preparation included inhaled bronchodilators, spirometry and chest therapy.

In the operating room, the patient had routine preparation, that is, a radial artery catheter, and a pulmonary artery catheter inserted to the right side avoiding a potentially hazardous pneumothorax on the side of the unique lung. Insertion of the pulmonary catheter offered no difficulty or resistance, nor did it disturb the pulmonary and systemic hemodynamics while it advanced in the unique left pulmonary artery trunk.

Thoracic epidural analgesia was considered but refused by the patient. After anesthesia induction, mechanical ventilation was set with a tidal volume of 500 ml (patient weighting 75 kg) and respiratory rate at 15 per minute.

On opening of the chest, the hyper inflated left lung bulged out and covered all the anterior aspect of the mediastinum. The mediastinum was shifted to the right. Aortic root was lying beneath the right aspect of the sternum, and the right atrium was far propelled against the right pericardial wall. This shifted anatomy posed technical difficulty in accessing the ascending aorta and the right atrium. After dissection of pericardial adherences, one venous cannula was inserted in the right auricle. Cardiopulmonary bypass was initiated as usual and cardioplegia administered via anterograde and retrograde intermittent injections. First, revascularization of the stenotic diagonal branch was done using a saphenous vein. On opening of the aorta, the valve was massively calcified. It was replaced with a 23 mm bio-prosthesis. Aortic cross-clamping and cardiopulmonary bypass times were 101 and 127 minutes. On weaning from bypass, dobutamine at 9 µg/kg/min was necessary and continued for the next day.

The patient was extubated the first day after surgery. His postoperative course was marked by mild tachypnea (24 breaths per minute) and large amounts of bronchial secretions, as his cough was inefficient in clearing the bronchial tree. The patient required continuous respiratory care including endotracheal suctioning, humidification of inhaled gases, respiratory therapy and intermittent non-invasive positive pressure ventilation. Blood gases were maintained within normal limits and repeated chest X-rays did not show infiltrate atelectasis or pleural effusion. Chest tubes were removed at day 3. Hemodynamically, the patient was stable. His pulmonary artery systolic pressure was maintained between 50 and 60 mmHg. At day 4, the patient developed atrial fibrillation hemodynamically well tolerated and treated with oral amiodarone. The respiratory state of the patient improved gradually. He was discharged from the intensive care unit at day 6 and left the hospital one week later.

DISCUSSION

Cardiac surgery following previous pneumonectomy has been associated with operative difficulties and postoperative respiratory morbidity [1-5], including pneumothorax [2], re-intubation [3, 6], mediastinitis [2]

and prolonged hospital stay [1, 4, 7].

Questions concerning management of this situation arose at each step in the care giving to our patient. First, in preparing the patient in the preoperative period, well-conducted inhaled bronchodilators, spirometry and chest therapy optimized the patient's pulmonary status. Second, one might wonder if anatomical changes following right pneumonectomy precluded a routine surgical approach. A thoracic scan was obtained in order to better elucidate the left lung anatomy and its consequences on mediastinal structures. Despite a right mediastinal shift, an orthodox approach was considered. Indeed, there were no posterior anastomoses to perform, as in the case of Soltanian et al. [5] and others [4]. Internal mammary artery harvesting could not be considered due to anatomical difficulties mostly for the compensatory over inflation of the left lung precluding its use without a major risk of tension on the anastomotic site. Opening of the left pleura during internal mammary harvesting can compromise the function of the left lung [3]. Even if feasible, an inadvertent lesion to the left phrenic nerve could be merciless for the left lung. Moreover, if it were a left pneumonectomy, exposure of the left internal thoracic artery would also be difficult [8]. There was no place for an off-pump technique in this actual case as pointed out by Pezzella [9], due to aortic valve replacement, otherwise effects of cardiopulmonary bypass on the lung could be avoidable.

Despite the risk of pulmonary artery catheterization in the presence of previous pneumonectomy, we felt that a Swan-Ganz catheter was needed for the perioperative management of a patient with pulmonary hypertension and compromised left ventricular function. Thoracic epidural analgesia would have been beneficial in improving pulmonary function after cardiac surgery [10] but the patient categorically refused it.

As for postoperative respiratory management, we were faced to three main problems : severe restrictive syndrome, pulmonary hypertension and absence of pulmonary reserve. With an appropriate respiratory care including intermittent non-invasive positive pressure ventilation, respiratory complications were avoided.

CONCLUSION

Combined coronary surgery and aortic valve replacement can be performed in patients with low left ventricular ejection fraction and a previous pneumonectomy. Postoperative pulmonary complications should be expected. Prognosis is favorable if the patients benefit from adequate preoperative assessment and preparation and from appropriate postoperative respiratory care.

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اشترك الجراحة الاكليلية والصمام الابهري البديل بعد استئصال رئوي ايمن سابقا

موجز : الجراحة القلبية عند من اجري لهم سابقا استئصال رئوي ليست عديدة استنادا الى المنشورات الطبية. نقدم حالة جراحة تجسيرية اكليلية مشتركة مع صمام ابهري بديل لمريض لديه قذف جزئي اقل من ٣٥٪ وفي سوابقه استئصال رئوي ايمن. نوقشت كل مراحل التهيئة للعملية لهذه الحالة.