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# Simultaneous cardiac surgery with pulmonary resection

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## ABSTRACT

**Introduction:** Combined heart surgery and lung resection remain a controversial issue. This method facilitates the treatment of two major problems with one intervention, reducing hospitalization cost with acceptable outcomes. On the other hand, skepticism exists related to the effects of cardiopulmonary bypass on malignancy, proper extent of lung resection from non-standard approach and to a possible greater risk of perioperative bleeding.

**Methods:** Between November 2010 and April 2014 ten patients (male 9, female 1) underwent simultaneous cardiac surgery and pulmonary resection (mean age  $69 \pm 7$  years). Pathological findings were as follows: primary carcinoma 4, benign lesion 4, metastasis 1, and carcinoid 1. Surgery at right lung was done in five cases and on left lung in five cases (lobectomy 5, extraanatomical resection 1, enucleation 3). In one case, because of the extent of malignant process, exploration only was done via sternotomy and pneumonectomy was performed later through thoracotomy. Cardiac procedures were as follows: coronary artery bypass grafting 5, aortic valve replacement 3, mitral valve replacement 1, ascending aorta replacement 1, and MAZE procedure 3. Sternotomy was performed in eight patients; in two of them left lateral thoracotomy was used and coronary artery revascularization was performed with MIDCAB principle. Off-pump surgery was used four times.

**Results:** There was no hospital mortality. There was no reexploration because of bleeding. Cardiac part of procedures was in all cases without complications. Prolonged air-leak was found in one case. All patients with benign pathology are alive. In the malignant group, one patient with staged approach died in terminal phase of disease and the second patient deceased because of disease-non-related reasons one year after surgery. The rest of them are followed up regularly by pneumo-oncology outpatient department.

**Conclusion:** Combined heart surgery and lung resection can be performed without increased mortality and/or morbidity. The synchronous treatment avoids the necessity of a second intervention with good results and economic benefits.

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## Introduction

Combined heart surgery and lung resection remain a controversial issue. This method facilitates the treatment of two major problems in one intervention with acceptable outcomes and overall cost reduction. With increasing age and frailty of the patient population, it is sometimes very difficult to perform two major surgeries during short time interval. Even, because of primary heart surgery complications, planned lung tumor resection can be delayed into the already inoperable condition due to malignancy spread. Psychological factor can also play an important factor, and few patients wish to have second extensive surgery.

The combined heart revascularization with lung resection was first reported by Dalton [1] in 1977 and Girardet [2] in 1981. In 1985, Piehler [3], on his 41 patients, concluded that it is possible to perform both procedures from sternotomy safely at the same time. On the other hand, skepticism exists related to the effects of cardiopulmonary bypass on malignancy and to a possible greater risk for perioperative bleeding. There are also concerns about completeness of pulmonary resection and staging from non-standard sternotomy approach. The purpose of this report is to present our experience with the combined surgical approach and evaluate its benefits and safety.

## Patients and methods

We present a series of ten patients who underwent combined surgical treatment for heart and lung disease in a one-step procedure between November 2010 and April 2014. There were nine males and one female. Their mean age was 69 (range: 59–79) years. Five patients were presented with a documented lung tumor and a concomitant heart disease. These were as follows: aortic stenosis; combined aorto-mitral disease with paroxysmal atrial fibrillation; aortic stenosis with dilatation of ascending aorta; ischemic heart disease and acute non-transmural myocardial infarction. In the other

group in five of the patients, pulmonary tumor was accidentally discovered on preoperative chest X-ray when cardiac procedure was planned.

The standard preoperative assessment included chest X-rays, computer tomography, lung function testing, echocardiography and coronary angiography. All patients were operated on the basis of an absence of mediastinal lymphadenopathy and metastatic disease according to the results of their preoperative evaluation.

After induction of general anesthesia, all the patients had a double lumen endotracheal tube positioned in order to achieve one-lung ventilation. Standard middle sternotomy was used in eight patients. Access to the chest cavity was gained through widely opened pleura on the affected side. Pulmonary surgery was carried out and a frozen pathological analysis was performed immediately. According to histopathology result the extent of resection was carried out. Left upper lobe was affected in three cases and left lower lobe in three cases. Right upper lobe was affected in one case, right middle lobe in two cases and right lower lobe in one case. Pulmonary lobectomy was performed in five cases, extraanatomical resection in one case and simple lesion enucleation in three cases respectively. In one case of previously known malignant tumor, more progressed disease with left hilus affection enforced us to indicate staged procedure – left lung resection with lymphadenectomy was carried out a month later from left thoracotomy. After lung resection, hemostasis was secured and heparinization instituted. Opened cardiac procedures were performed on CPB (cardio-pulmonary bypass) with antegrade cold blood cardioplegia. Off-pump approach for revascularization was used in two sternotomy cases. Prior to chest closure, chest drain was inserted into the pleural cavity. Mediastinum was drained with redon drains as ordered by department long-term experience.

In two patients with known left lung tumor and localized left anterior descending artery (LAD) stenosis (one with NSTEMI), left thoracotomy approach was used because of our experience with MIDCAB surgery. In these cases LIMA harvesting and heart revascularization were performed first

**Table 1 – List of patients, lung tumor localization, heart surgery and tumor histopathology.**

No.	Sex	Age	Tumor localization	Lung surgery	Heart surgery	Tumor
1	M	59	LUL	Enucleation	AVR, MAZE	Hamartoma
2	M	71	LLL	Exploration	AVR	Primary CA
3	M	66	RUL	Lobe resection	AVR, MVR, MAZE	Primary CA
4	M	67	RML	Lobe resection	CABG 2×	Metastasis
5	M	68	LUL	Lobe resection	CABG 4×	Carcinoid
6	F	74	LUL	Wedge resection	CABG 3×	Lung infarction
7	M	79	RML	Enucleation	AVR, asc. aorta replacement, MAZE, CABG 1×	Lung infarction
8	M	65	RLL	Enucleation	CABG 2×	Hamartoma
9	M	76	LLL	Lobe resection	MIDCAB (LAD)	Primary CA
10	M	65	LLL	Lobe resection	MIDCAB (LAD)	Primary CA

LUL, left upper lobe; LLL, left lower lobe; RUL, right upper lobe; RML, right middle lobe; RLL, right lower lobe; AVR, aortic valve replacement; MVR, mitral valve replacement; CABG, coronary artery bypass grafting; MIDCAB, minimally invasive direct coronary artery bypass; LAD, left anterior descending artery.

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