

TRATAMENTO CIRÚRGICO DE DOENÇA CARDÍACA SEVERA E CANCRO DO PULMÃO CONCOMITANTES

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Resumo

A apresentação concomitante de cancro do pulmão e doença cardíaca severa necessitando intervenção é um cenário frequente na prática clínica. O seu substrato fisiopatológico comum é desconhecido e acredita-se que o tabagismo possa ser um agente associado. Do ponto de vista cirúrgico, estes pacientes colocam vários desafios técnicos e a literatura médica é escassa em providenciar respostas robustas. O objetivo deste relato consiste em rever a nossa experiência com casos submetidos a tratamento cirúrgico combinado das patologias supracitadas, visando analisar as características dos pacientes, considerações das técnicas operatórias e eventos relacionados.

Um total de cinco pacientes foram incluídos, com dois procedimentos síncronos, dois casos que tiveram a cirurgia pulmonar como primeiro procedimento e um caso iniciado com cirurgia cardíaca. Histologicamente, todos os cancros eram carcinomas pulmonares de não pequenas células ou tumores carcinóides e a patologia cardíaca mais representativa foi a estenose valvular aórtica. A lobectomia foi executada em 2/3 dos pacientes e em 60% dos casos foram utilizadas técnicas minimamente invasivas. Todos os pacientes valvulares receberam próteses biológicas. Houve uma complicação pós-operatória imediata, com recuperação favorável, e não ocorreram eventos tardios no seguimento (duração mediana de $1,8 \pm 1,1$ meses).

A análise destes casos enfatiza a complexa natureza destes pacientes desafiante e reforça a importância em dedicar esforços para oferecer as soluções mais adequadas para cada cenário.

Abstract

Surgical treatment of concomitant severe heart disease and lung cancer

The concomitant presentation of lung cancer and severe heart disease requiring intervention is a scenario that many clinicians have to face. Its common physiopathological substratum is unknown and it is believed that tobacco plays a role. From a surgical point of view, these patients pose various technical challenges and medical literature is scarce in providing solid answers. The aim of this report is to review our experience with cases undergoing combined surgical treatment of both heart disease and lung cancer, aiming to analyse patients' characteristics, operative technical considerations and related outcomes.

A total of five patients were included, with two synchronous procedures, two cases with lung surgery being performed first and one case commenced with cardiac surgery. All cancers were non-small-cell lung carcinoma or carcinoid tumors and cardiac disease was mostly represented by severe aortic stenosis. Lobectomy was performed in two thirds of patients and minimally invasive techniques were used in 60% of the procedures. All valvular patients received a bioprosthesis. There was one immediate complication, with good recovery on follow-up, and there were no late events (median follow-up of $1,8 \pm 1,1$ months).

The analysis of these cases highlights the complex nature of these challenging patients and reinforces the importance of devoting efforts to offer the most suitable solutions for each scenario.

INTRODUCTION

Lung cancer and heart disease requiring intervention may coexist.¹ Frequency is assessed at around 1,9-6,9% in general population², although it fluctuates

between studies and might be underestimated, mainly due to subdiagnosis and a non-surgical approach towards heart disease.³ Regarding its physiopathology, it is hypothesised that tobacco might be the common etiologic agent, but true correlation is unknown.^{2,4}

Table 1 Preoperative baseline characteristics of the patients undergoing heart and lung surgery

	Gender	Age	Risk factors	LUNG CANCER					HEART DISEASE	
				HISTOLOGY	STAGING	CHEMO	RADIO	PFT	PATHOLOGY	LVEF
1	♂	73	HTN, Dyslipidaemia	Carcinoid tumour / well differentiated neuroendocrine carcinoma	IIA	No	No	Normal	Severe aortic stenosis	60
2	♂	74	Smoking Prostate cancer HTN, Dyslipidaemia	Adenocarcinoma, with visceral pleural invasion	IB	No	Yes	Normal	Severe aortic stenosis	64
3	♀	66	HTN	Carcinoid tumour	IA2	No	No	Normal	Severe aortic stenosis	61
4	♀	65	HTN	Acinar-predominant invasive adenocarcinoma	IA3	No	No	Normal	Severe aortic stenosis	61
5	♂	65	Smoking HTN, Dyslipidaemia	Moderately differentiated adenocarcinoma	IA3	No	No	Normal	CAD	60

CAD coronary artery disease; CHEMO chemotherapy; HTN hypertension; LVEF left ventricle ejection fraction; PFT pulmonary function tests; RADIO radiotherapy

Patients undergoing a combined procedure are mainly divided in two groups: those who are subject of a cardiac surgery and a lung tumour is identified (the predominant presentation); and those who have lung cancer and cardiac disease is uncovered in the pre-operative evaluation.⁵ Accordingly, it still is a challenge deciding the most appropriate therapeutic strategy in this scenario, particularly the surgical timing, and specific guidelines addressing this conundrum do not exist.^{1,2,4,5} Some claim that a concomitant procedure might be associated with a risk of dissemination, mechanical stress in the cardiac function, inability to perform radical lymph node dissection, and the risk of increased blood loss due to the effect of heparinization. On the other hand, a synchronous approach allows the timely treatment of both entities without delay, delivers less surgical morbidity to the patient and has logistical and financial advantages. Additionally, with the expansion of percutaneous interventions, some series suggest a statistically non-significant tendency of better prognosis by approaching the oncologic condition first.^{4,5}

The aim of this report is to review our experience with cases undergoing concomitant surgical treatment of both heart disease and lung cancer, aiming to analyse patients' characteristics, operative technical considerations and related outcomes.

CLINICAL CASES

From January 2014 to December 2017 five patients underwent cardiac surgery and tumour lung resection at our department of Cardiothoracic Surgery. Mean age was 69 years-old⁶⁵⁻⁷⁴, 40% were female and weighted a median of 70Kg.⁵⁴⁻⁸² A summary of the clinical data is presented in Table 1. Regarding the **pulmonary disease**, all cancers were non-small-cell lung carcinoma (NSCLC), of which 60% were adenocarcinoma, and 40% neuroendocrine and staging was between IA2 and IB. All patients had a normal spirometry, one patient (20%)

had a previous cancer history (prostatic) and 40% were smokers. Previous histological analysis was mandatory in all cases to define therapeutic strategy, except if resection was needed for diagnostic purposes. **Heart disease** was mostly severe aortic stenosis (80%) and all patients had normal systolic function (average left ventricle ejection fraction of 61%).⁶⁰⁻⁶⁴ Regarding other cardiovascular risk factors, all patients were hypertensive and none were diabetic.

Procedural characteristics are summarised in table 2. In 40% of the cases surgeries were done synchronously, in other 40% lung surgery was performed first and one case commenced with cardiac surgery. When staged, there was a median interval of 146 days¹⁰⁰⁻²⁶¹ between surgeries. For **lung surgery**, 80% consisted in lobectomy and there was one isolated nodule resection. 60% of the procedures were executed with minimally invasive techniques via video-assisted thoracoscopic surgery (VATS). Remarkably, one of these cases was done synchronously with the revascularisation surgery (coronary and thoracic anatomies represented in figures 1 and 2). There was one complication after lung surgery, an acute spinal cord infarction, resulting in a total hospitalisation duration of 36 days, but with good later recovery. The average hospitalisation duration was 11 days.³⁻³⁶ Regarding cardiac surgery, it is noteworthy that all valves used were bio-prosthetic, no complications occurred and mean hospitalisation duration was 7 days.⁶⁻⁹ Further follow-up of all patients (656 ± 407 days) showed no events.

DISCUSSION

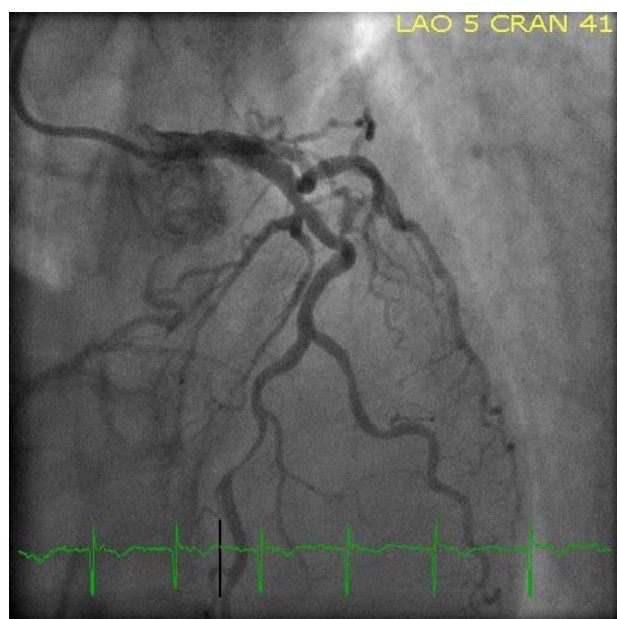
When comparing the description of our cases with what is known from published literature, we confirm a reasonably similar oncologic pulmonary manifestation, with predominance of earlier stages of the disease, NSCLC and adenocarcinoma.^{1,3,5} Likewise, from the demographic point of view, there is also a male predominance and age distribution around the seventh decade of

Table 2 Surgery details and postoperative outcomes

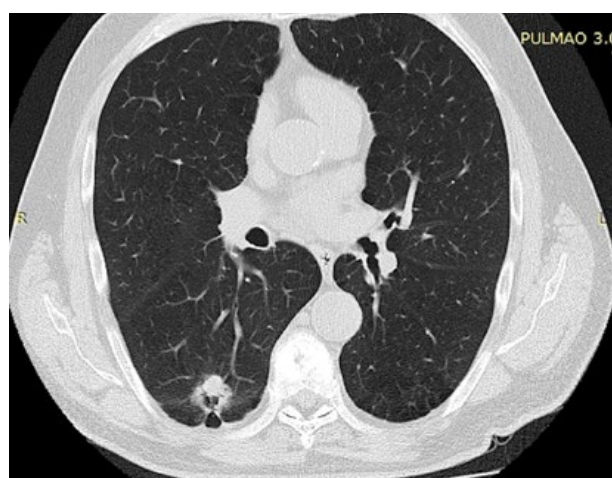
	SURGICAL TIMING	LUNG CANCER		HEART DISEASE		IMMEDIATE COMPLICATIONS	HOSPITALISATION DAYS	FOLLOW-UP
		HISTOLOGY	INTERVENTION	PATHOLOGY	INTERVENTION			
1	1. CARD 2. PULM [100 days]	Carcinoid tumour	RLL lobectomy + lymph node dissection (R9 and hilum) + retrosternal abscess drainage	Severe aortic stenosis	AVR bioprosthetic + AA endarterectomy	PULM: acute spinal cord infarct and lower limbs paraplegia*	CARD 9 PULM 3	No events
2	Concomitant	Adenocarcinoma	RML wedge resection	Severe aortic stenosis	AVR bioprosthetic + AA endarterectomy	None	6	No events
3	1. PULM 2. CARD [108 days]	Carcinoid tumour	RLL lobectomy	Severe aortic stenosis	AVR bioprosthetic	None	PULM 5 CARD 6	No events
4	1. PULM 2. CARD [261 days]	Adenocarcinoma	RUL lobectomy	Severe aortic stenosis	AVR bioprosthetic + AA endarterectomy + Septal myomectomy	None	PULM 3 CARD 6	No events
5	Concomitant	Adenocarcinoma	RLL lobectomy	CAD	CABG (LIMA-LAD)	None	7	No events

* Favourable evolution, with gait progression

AA ascending aorta; AVR aortic valve replacement; CABG coronary artery bypass grafting; CAD coronary artery disease; CARD heart surgery; LIMA-LAD bypass grafting with left internal mammary artery to the left anterior descending artery; PULM lung surgery; RLL right lower lobe; RML right middle lobe; RUL right upper lobe.

**Figure 1**

Coronary anatomy of a patient undergoing synchronous uniportal video-assisted thoracoscopic surgery and coronary artery bypass graft (left internal mammary artery to the left anterior descending artery).

**Figure 2**

Chest computed tomography scan showing a 29*25*21mm tumour located in the right lower lobe, from a patient undergoing synchronous uniportal video-assisted thoracoscopic surgery and coronary artery bypass graft.

life.³⁻⁷ However, regarding heart disease, we had a higher prevalence of valvular pathology, with 80% of the cases corresponding to severe aortic stenosis, whereas other series report 36-79% of the cardiac cases being coronary and 18-67% valvular heart disease.^{1,4-6} We hypothesise that this is merely a manifestation of random distribution

in a small sample size and that smoking status might be one of the prevailing pathologic explanations. Nonetheless these results spark etiologic questions whether other common cellular pathways, like inflammation and neuroendocrine stress, might play a role in these complex phenomena.

In such a challenging and evolving field as it is Cardiothoracic Surgery, it is of utter importance to highlight some technical considerations.

Surgical timing: as previously stated, it is a field of heated debate, with authors that support a synchronous

approach, while others rather prefer a staged procedure.^{1,2} Some believe that the decrement in pulmonary vascular bed caused by a lobectomy or a pneumonectomy might result in a serious strain on cardiac function and that postoperative complications may increase after radical lung surgery.⁶ In our series, in order not to delay oncologic treatment, preference was given to lung surgery or synchronous approach. One patient commenced with cardiac surgery, due to the severity of aortic stenosis and the less invasive nature of carcinoid tumour. Finally, timing decision was adapted to technical considerations and flexible to the patient condition after the first procedure.

Lung surgery technique: according to the guidelines lobar resection is the preferred method, with lobectomy representing 78% of the cases,⁵ but VATS use is still meagre and is still valid even in concomitant procedures.¹ In our series, VATS was performed in 60% of the cases, without immediate complications and resulting in shorter and more comfortable hospitalisations. Additionally, there have been recent improvements in automatic suture instruments for pulmonary resection, and this has contributed to a lower incidence of perioperative thoracic haemorrhage despite administration of anticoagulants.⁶ Lobectomy was preferred over nodule resection due to the potential malignancy of the carcinoma.

Cardiac surgery modality: this is a matter of intense debate and although some authors do cite benefits of off-pump coronary artery bypass grafting with lung resection.^{4,7} Schoenmakers et al found no evidence in supporting this approach being superior to on-pump surgery in this setting in a 5-year follow-up.⁸

Even with these difficult settings, descriptive studies have been showing promising results in this challenging population, with low immediate mortality rates,⁵ a 31% complication rate,¹ 13-16 days of hospitalisation,^{4,7} and a 84,5% survival at five years¹ – a clinical picture in accordance with our results. Staging of the oncologic disease appears to play a crucial role,^{3,5} with operated patients having a 2-year cancer-free rate of 79%.⁴

This work has the inherent limitations of descriptive case reports with a sparse number of cases. Furthermore, we did not include patients whose cardiac condition was treated by means of a percutaneous intervention, particularly coronary patients – a comparison that had to take into account the clinical, anatomic and haemorrhagic considerations by the Heart Team.^{3,5}

CONCLUSION

These cases highlight the complex nature of patients enduring both severe heart disease and lung cancer, as many clinical and technical questions arise. The event-free follow-up of these cases emphasises the importance of not restraining therapeutical solutions for these patients. The actual literature scarcity endorses the importance of sensitizing the medical community to study and accompany this population, aiming to better assess the real impact of contemporary interventions and further investigate the most appropriate solutions.

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