General Thoracic and Cardiovascular Surgery (2019) 67:321–323
https://doi.org/10.1007/s11748-018-0901-6

CASE REPORT

Transcatheter aortic valve implantation: a safe and efficient procedure to treat an aortic valve stenosis before lung cancer resection

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Received: 13 October 2017 / Accepted: 18 February 2018 / Published online: 28 February 2018

Abstract
A 75 year old man presented with left upper lobe squamous cell carcinoma. Severe aortic stenosis has been discovered during preoperative assessment. In this situation, two therapeutic strategies are described: concomitant or two-staged procedures. The debate has not yet led to the conclusion on whether preferably performing one or the other. Furthermore, in an oncologic context, using cardiopulmonary bypass is still controversial. So, thoracic and cardiac surgeons jointly proposed to the patient a transcatheter aortic valve implantation followed, 72 h later, by lung cancer resection. This case report describes a way to treat both diseases avoiding cardiopulmonary bypass adverse effects and without delaying lung cancer treatment.

Keywords TAVI · Lung cancer · Cardiopulmonary bypass

Introduction

Aortic valve stenosis can be incidentally discovered during preoperative evaluation of lung cancer. Treatment strategy includes simultaneous or staged procedures but the use of cardiopulmonary bypass (CPB) in an oncologic context is still controversial. We herein present the case of a left upper lobectomy performed 72 h after transcatheter aortic valve implantation (TAVI).

Case report

A 75 year-old man presented with left upper lobe squamous cell carcinoma infiltrating the left pulmonary artery and the left upper lobe bronchus (Fig. 1). Preoperative evaluation highlighted severe aortic stenosis (mean aortic valve gradient of 42 mmHg), yet asymptomatic, considered as a high risk factor for general anesthesia. Therapeutic strategy consisted of a TAVI (Fig. 2) through the right femoral artery under local anesthesia and monitored care. The transfemoral access was chosen to avoid the left anterior thoracotomy incision of the transapical approach, in a patient supposed to receive a left postero-lateral thoracotomy few days later. We let the patient recover about 3 days in ICU to control any vascular complications or heart conduction disorder requiring a permanent pacing. The patient had an uneventful recovery, so 72 h later, he underwent left upper sleeve lobectomy with pulmonary arterioplasty. Post-operative course was complicated by a right pneumonia and atrial fibrillation, with a good secondary resolution. The patient was discharged 16 days after surgery. The patient only received preventive anticoagulation during 1 month by low-molecular-weight heparin. The pathological report confirmed a pT3N2 squamous cell carcinoma with negative surgical margins. A year after lobectomy, the patient is still free from tumor recurrence and the aortic valve is normally functional with a mean gradient of 14 mmHg.

Discussion

Surgery is the cornerstone of curative treatment for non-small cell lung cancer. However, cancer and heart disease may coexist, particularly coronary, but also valvular disease,

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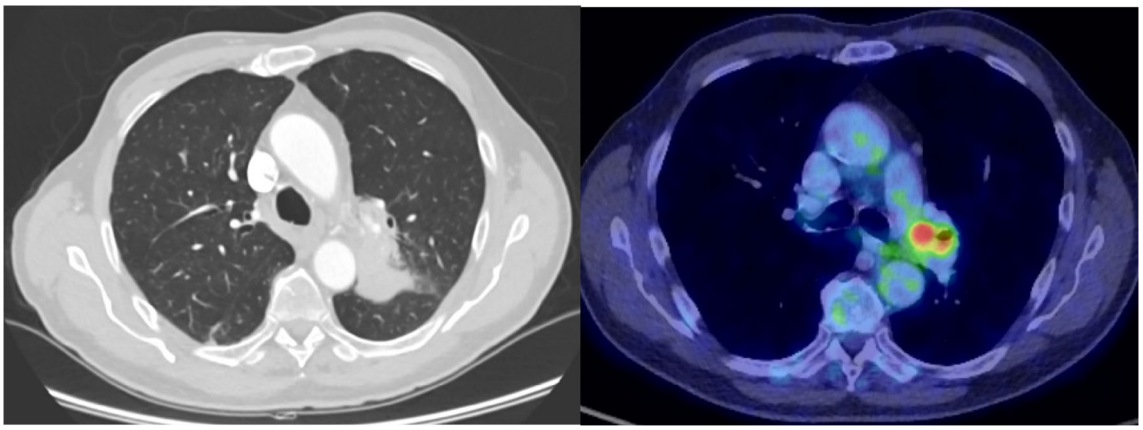

Fig. 1 Thoracic computed tomography scan and PET scan showing a left hilar mass infiltrating the origin of the left upper lobe bronchus and the left pulmonary artery

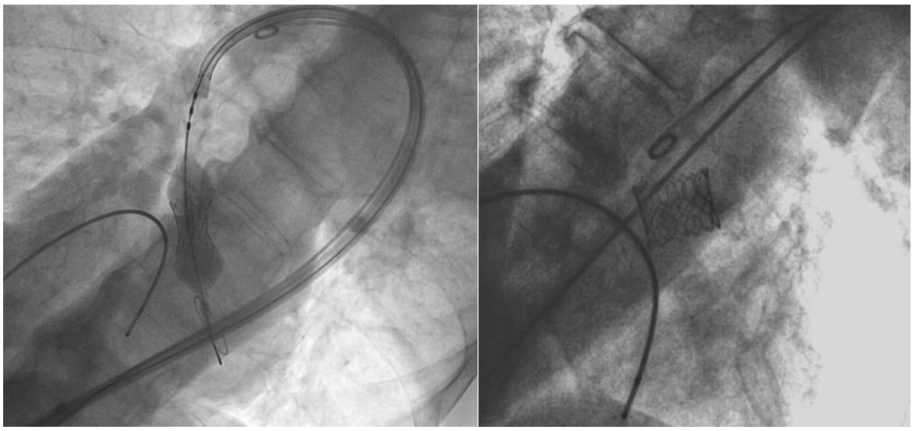

Fig. 2 Fluoroscopy during transcatheter aortic valve implantation with a balloon-expendable device (23 mm Edwards SAPIEN3 valve)

most likely due to the same risk factors. Thus, preoperative cardiac evaluation is mandatory to ensure the best post-operative outcomes, but it may subsequently delay lung cancer surgery.

The debate over the past years has focused on whether performing concomitant or two-stage procedures. Combined procedures have a high level of in hospital mortality reaching 7% [1]. The concomitant approach is associated with substantially higher perioperative morbidity rendering the staged approach the preferred one. However, the second stage is usually delayed by 4–6 weeks, allowing recovery and complete healing of the sternum enabling lateral decubitus for pulmonary resection. But this delay potentially leads to unresecability or metastatic spreading. Causes of late deaths were identical in both groups: disseminated metastatic disease and anticoagulant related hemorrhage [2]. Conversely, there are less major bleeding complications reported after TAVI procedures [3].

Performing concomitant or two-stage procedures does not avoid CPB complications. Multiple disadvantages have been described such as increased risk of bleeding or dissemination of tumor cells due to the immunosuppressive and inflammatory effects of CPB. An increased risk for overall cancer incidence and cancer specific mortality were observed in patients undergoing on pump coronary artery bypass [4]. This could represent a strong argument in favor of off pump coronary bypass procedures whenever possible. The largest increase in cancer incidence was observed for skin melanoma just followed by lung cancer.

In the past decade, TAVI has become a safe alternative strategy in the treatment of severe aortic stenosis. In this group of patients, overall mortality at 1 year after TAVI was lower than after surgical aortic valve replacement [3]. Often performed under local anesthesia, it allows a faster recovery and avoids two consecutive general anesthesias in already fragile patients. Transapical aortic valve implantation with simultaneous pulmonary resection has been published with good long-term results [5] but TAVI via transfemoral access followed by lung cancer resection has not been described yet.

Conclusion

Transcatheter aortic valve implantation is a safe and efficient option for patients with lung malignancy and aortic valve disease. This strategy avoids the delay in the treatment of bronchogenic carcinoma and abolishes the adverse effects of CPB.

Compliance with ethical standards

Conflict of interest The authors have declared that no conflict of interest exists.

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