Intrapericardial left pneumonectomy after induction chemotherapy: The risk of cardiac herniation

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Acute cardiac herniation is a rare and well-described complication of intrapericardial pneumonectomy. It usually occurs within 24 hours after the operation, and it is associated with high mortality. Survival of the patient can be achieved by early diagnosis and immediate treatment.^{1,2}

We present a case of cardiac herniation after intrapericardial pneumonectomy in a patient who previously underwent induction chemotherapy, although the pericardial defect had been accurately closed. There are few reported cases in the literature of this exceptional complication.³

Clinical Summary

A 67-year-old man with a history of smoking 20 cigarettes per day for 40 years presented with a left hilar pulmonary mass. The patient underwent a chest computed tomographic (CT) scan, and a bulky clinical N2 disease was evident. Bronchoscopic examination showed that the left upper lobe was almost obstructed by a submucosal tumor. Biopsy and brush cytology results were negative. The histologic diagnosis of squamous cell carcinoma was obtained by using a CT-guided fine-needle aspiration biopsy. A complete assessment for distant metastases by means of bone, abdominal, and brain CT scanning was negative.

On the basis of the preoperative staging, the patient was submitted to 3 cycles of induction chemotherapy with a partial but major response on the CT scan. The assessment for distant metastases was repeated, and results were negative. A complete study of the pulmonary function demonstrated a mild respiratory insufficiency: forced expiratory volume in 1 second, 1.79 L (60%); vital capacity, 2.33 L (60%); total lung capacity, 4.26 L (66%); and carbon monoxide diffusion in the lung, 75%. A nuclear scan showed 71% of perfusion to the right lung and 29% to the left. The patient was submitted for surgical intervention.

At thoracotomy, a hilar mass was identified involving the upper pulmonary vein, which had to be ligated inside the pericardium. A pneumonectomy was performed. Dissection of the mediastinal nodes was also performed. The 3 × 3-cm pericardial defect located around the upper pulmonary vein was closed with 4 nonabsorbable 2-0 stitches. The patient was not extubated at the end of the procedure because of respiratory conditions, and he was transferred to the intensive care unit. Seven hours after the operation, the patient had arrhythmia and a slowly progressive heart failure. His blood pressure was 100/50 mm Hg, with a central venous pressure of 10 mm Hg and a pulse of 110 beats/min. On chest radiography, a herniation of the heart into the left hemithorax was suspected. The diagnosis was confirmed by a chest CT scan (Figure 1). The patient was immediately transferred to the

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Figure 1. CT scan showing the heart herniated in the left side of the chest through the hole of the pericardium (arrow).

operating theater. At thoracotomy, the heart was completely herniated in the left chest through a defect of the pericardium, which, although enlarged, strangulated the great vessels. The first maneuver was to open the pericardium widely to allow the normal blood circulation to the heart and its repositioning in the pericardial sac. The stitches were still knotted, but now the pericardial defect was enlarged up to 12×4 cm. The defect was closed with a patch of polytetrafluoroethylene.

The postoperative course was uneventful, and the patient was discharged on the 12th postoperative day. Postoperative pathologic staging was G2 T3 N1 M0. The patient is disease-free and alive at 16 months' follow-up.

Discussion

Induction chemotherapy seems to offer good results in patients with local or regional advanced non-small cell lung carcinoma.⁴ In

most of these patients, a radical surgical resection can be achieved after 3 cycles of chemotherapy. However, there is general knowledge that pulmonary resection in patients who have received induction chemotherapy may be technically challenging.⁴ In fact, in our patient the hilum and the mediastinum were surrounded by dense fibrotic tissue. It was necessary to open the pericardium and to ligate the vessels inside to achieve good control of the superior pulmonary vein and to obtain a radical resection on the basis of the preinduction chemotherapy stage. The pericardial defect was closed with 4 separate stitches, as we usually do after intrapericardial pneumonectomy, to avoid heart herniation that was never verified in our practice before this case. In this patient the pericardium was dense, anelastic, and fibrotic because of the induction chemotherapy. These fibrotic changes have probably played a major role in the laceration of the pericardium and in the cardiac herniation, as reported by others.⁵ The pericardial patch we used in the second operation was successful in closing the defect, and the postoperative course was uneventful.

On the basis of this experience, we can conclude that in patients undergoing induction chemotherapy, the pericardial defect after intrapericardial pneumonectomy should always be closed without tension using a pericardial patch to avoid cardiac herniation.

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