Complete resection of recurrent thymic carcinoid using cardiopulmonary bypass

Tohru Sakuragi*, Kazuhisa Rikitake, Masafumi Nastuaki, Tsuyoshi Itoh

Department of Thoracic and Cardiovascular Surgery, Saga Medical School, 5-1-1 Nabeshima, Saga City 849-8501, Japan

Received 3 July 2001; received in revised form 13 September 2001; accepted 10 October 2001

Abstract

We report a case of recurrent thymic carcinoid (multiple episodes of recurrence over a 14-year period) invading the right atrium and superior vena cava, which was resected using cardiopulmonary bypass. In our case with dense adhesion between the great vessels and the sternum as a result of repeated operations and therapeutic irradiation, the innominate artery was injured while re-sternotomy, which was successfully repaired under deep hypothermic circulatory arrest. Repeated aggressive surgical resection might improve prognosis of the recurrent thymic carcinoid even in patients with extended lesions, which could be completely resected only on cardiopulmonary bypass.

Keywords: Thymic carcinoid; Cardiopulmonary bypass; Deep hypothermic circulatory arrest

1. Introduction

Carcinoid tumor of the thymus is a rare neoplasm, which is considered to be prone to recurrence even after 'complete' excision. Therefore, aggressive surgical extirpation offers the best hope for cure [1].

We report our recent experience of a recurrent thymic carcinoid tumor completely resected with cardiopulmonary bypass. The use of deep hypothermic circulatory arrest was helpful to control massive bleeding from the injured innominate artery with dense adhesion to the sternum, which was related to repeated operations and therapeutic irradiation.

2. Case report

A 47-year-old man was referred to our hospital for treatment of a locally recurring thymic carcinoid originating from the mediastinum. The patient had previously undergone three separate operations for this tumor in the referring hospital. In the initial operation, performed 12 years previously, extended thymectomy and sampling of the mediastinal lymph nodes via median sternotomy were performed. The pathological diagnosis was a thymic carcinoid tumor with lymph node metastasis. Postoperative chemotherapy with a combination of vincristin, nimustine, and doxorubicin was administered. The patient underwent the second median sternotomy 5 years later. This included combined resection of the recurrent tumor and the pericardium that was directly invaded. Review of the record of this operation showed that the pericardial defect was left open. One year later, recurrence was detected on the left side of the mediastinum and resection of it was performed through a lateral thoracotomy. During this third operation the left phrenic nerve, which was involved in the tumor, was resected leading to permanent ipsilateral phrenic nerve paralysis. Adjuvant irradiation therapy (39 Gy) was performed on the bilateral supraclavicular area and the mediastinum. Regular follow-up studies disclosed recurrence of the tumor in the mediastinum 6 years after the third operation. Chest CT scan revealed a large tumor invading the right atrium (RA) and superior vena cava (SVC) (Fig. 1). All laboratory investigations, including a 24-h urine collection for 5-hydroxyindole acetic acid and electrocardiogram, showed no abnormality. A complete resection of the tumor using cardiopulmonary bypass (CPB) was scheduled. Because the dense adhesions between the sternum and the great vessels resulting from repeated operations and radiotherapy was suspected by chest CT (Fig. 2), the preceding cannulation into the common femoral artery and vein with low-dose heparinization was done in anticipation of massive bleeding during re-sternotomy and dissection of
the adhesion. In spite of the careful procedure, injury of the innominate artery, which was torn while trying to re-open the sternum, made us establish CPB quickly. Deep hypothermic circulatory arrest (DHCA) was performed in order to cope with the massive bleeding from the tear site at the innominate artery, which was repaired by the direct suture. The total circulatory arrest time was 43 min. Extensive en-bloc resection of the tumor, including the anterior wall of the RA and proximal superior vena cava, was performed on CPB. The defect of the RA and SVC was repaired using a sheet of bovine pericardial patch, 7 × 4 cm in size. This patient uneventfully recovered quite well without cardiac rhythm disturbance or right phrenic nerve palsy. The histological type of the tumor was atypical carcinoid. There has been no evidence of recurrence during the 20-month follow-up period after the last operation.

Fig. 1. Preoperative contrast computed tomographic scan showing the thymic carcinoid tumor anterior to the superior vena cava. The tumor had invaded and filled the right atrium. (Ao, aorta; T, tumor; SVC, superior vena cava; RA, right atrium; RV, right ventricle; LV, left ventricle).

Fig. 2. Contrast computed tomographic scan reviewed the innominate artery, which was adhered to the sternum. (IA, innominate artery).
3. Comment

We report our recent experience of a recurrent thymic carcinoid tumor completely resected with cardiopulmonary bypass. Combined resection of the great vessels and/or atria has been rarely reported in the patients with malignant tumors of the thymus. Fujino et al. reported a case of thymic carcinoma that invaded the main pulmonary artery and was resected using cardiopulmonary bypass [2], and also a case of invasive thymoma that was resected with reconstruction of the aortic arch under DHCA with retrograde cerebral perfusion [3].

Several investigators [4–7] have reported favorable results following complete resection of this type of tumor. Fukai et al. [7] reported that a thymic carcinoid should be regarded as a malignant lesion that tends to recurrence even after total excision, and that aggressive management, including re-excision of the subsequent recurrent tumor, should be necessary for survival. Nakagawa and coworkers [6] reviewed 160 cases of thymic carcinoid and emphasized that these patients should be treated with complete resection, including dissection of the lymph nodes combined with resection of the adjacent organs, followed by radiotherapy.

The use of CPB for resection of malignant neoplasms remains controversial due to possible systemic tumor dissemination by CPB, and post-operative temporary impairment of the immune system [8]. However, because complete resection of this tumor is of utmost importance in the treatment of these patients, aggressive surgical extirpation should be considered in cases of thymic carcinoid, even in patients with advanced lesions required circulatory assist with CPB.

In our case, the use of DHCA was quite helpful to control massive bleeding from the injured innominate artery caused by dense adhesion to the sternum, which resulted from repeated operations and therapeutic irradiation. We believe that exposure of the femoral artery and vein for quick establishment of CPB prior to re-sternotomy is an important strategy for management of bleeding from the tight adhesions due to such post-therapeutic conditions.

In conclusion, aggressive repeated resections of thymic carcinoid, which is prone to recurrence even after complete resection, may improve the prognosis. Cardiopulmonary bypass could be a useful optional method in the surgical treatment of this tumor.

References