Reconstruction of Superior Vena Cava in Invasive Thymoma*

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Aggressive en-bloc resection of the superior vena cava was performed in a 50-year-old man who had superior vena caval syndrome caused by invasive thymoma. After the superior vena cava was resected, a Gore-Tex vascular graft was used to reconstruct the lower end of the right innominate vein and lower end of the superior vena cava. The patient was treated with postoperative radiotherapy to the mediastinum and has been asymptomatic for 14 months following surgery. (Chest 1990; 97:502-03)

Thymic tumors are uncommon but may be seen relatively often in the Far East and particularly in China. Survival of patients with thymoma and invasive tumors is fairly good, if properly managed. Cases of noninvasive thymoma may be cured by surgery. Those with invasive lesions can be treated with additional radiotherapy. In cases with either unresectable lesions or metastatic disease, chemotherapy may be useful.

We have seen one patient with invasive thymoma which invaded the right upper lung and the superior vena cava. We treated him with en-bloc resection of the tumor and superior vena cava followed by Gore-Tex vascular grafting and obtained good results. This report describes the treatment and results of this surgery.

CASE REPORT

This 50-year-old man was hospitalized for assessment of progressive dyspnea and pressure sensation over his head and neck of three months' duration. Pertinent findings showed venous distension over the neck and upper chest, swelling of his face, and a mass in the upper anterior mediastinum (Fig 1). Computerized tomography of the chest and a superior vena cavagram revealed a mediastinal tumor with superior vena caval obstruction. A thoracotomy was performed and the mediastinum was explored through a median sternotomy. A hard but movable tumor, measuring 8 x 10 cm in size and with irregular margins, was found to occupy the superior anterior mediastinum and abut the anterior segment of the right upper lung and the pericardium. The tumor invaded the superior vena cava and left innominate vein, causing obstruction of these vessels. The left innominate vein was ligated. The right lung was separated from the tumor by sharp and blunt dissection. Both the tumor and the superior vena cava from the bifurcation of the right and left innominate vein were resected. A segment of Gore-Tex vascular graft, 12 cm long by 14 mm wide, was bridged between the lower end of the right innominate vein and lower end of the superior vena cava with an end-to-end anastomosis to reconstruct the resected cava (Fig 2). Microscopic examination of the tumor showed a thymoma with prominent epithelial cells and lymphocytes with capsular invasion.

He was treated with radiotherapy to the mediastinum and is asymptomatic and free of disease 14 months after surgery.

DISCUSSION

Thymic tumors are uncommon, constituting about 20

\[\text{FIGURE 2. Schematic drawing of the location of invasive thymoma and reconstruction of the superior vena cava with Gore-Tex graft.}\]
percent of the cases with mediastinal masses; however, they are seen more often in China.1,4 Complete resection of the tumor is the best treatment for those without invasion and resection followed by radiotherapy or chemotherapy are for those with invasion or metastasis.3-4 The five-year survival rate of thymoma is 85 percent in those patients without invasion and 50 percent in those with invasive tumor.4

Patients with superior vena cava obstruction and superior vena cava syndrome may be treated with surgery, radiotherapy and/or chemotherapy. Surgical intervention with vascular reconstruction included methods using autograft, venous homograft, or artificial graft.6-7 Venous replacement with autograft gave the best result but it is not always feasible to obtain a large, expandable autogenous vein for use.8 The use of the venous homograft would obviate the problem of graft availability, but the late patency rate for such grafts is only 10 to 37 percent. The common causes of occlusion of such venous grafts are intimal thickening, disruption of the media, and perivascular fibrosis due to its antigenicity.6 Synthetic grafts thrombose easily because of their surface properties.6 Gore-Tex is possibly an exception and has been used for innominate vein replacement with success.7,8 The patency rate of Gore-Tex graft in animal studies is 83 percent and in human clinical trials, 62 percent.8 The survival rate of 13 patients with mediastinal-pulmonary malignant tumor who had resections of their tumor and superior vena cava followed by Gore-Tex reconstruction was 27 percent at three years.8

Invasive thymoma with superior vena cava syndrome is rare. Only four cases had been reported in the English literature.5-8 Darbevelle et al8 reported good results in treating one patient with en bloc resection of the tumor and a segment of superior vena cava and innominate vein followed by venous reconstruction.8 In the report of Mendez-Fernandez et al,8 thymoma invaded the left innominate vein without obstruction, and en-bloc restriction of the tumor and a segment of the innominate vein was performed followed by reconstruction of the innominate vein with a ringed Gore-Tex graft. The result at six months was satisfactory. In the case of Arai et al,10 the thymoma involved the left innominate vein causing complete occlusion. En-bloc resection of the tumor and the left innominate vein was done, followed by reconstruction of the superior vena cava and right innominate vein with autogenous venous graft. Postoperative radiotherapy was not given, but the venous graft remained patent. Tanabe et al11 reported the long-term follow-up of one patient with thymoma who was treated with reconstruction of superior vena cava and Teflon patch angioplasty; the graft remained patent for more than ten years. These gratifying results in the literature and of our own experience seemed to justify the notion that invasive thymoma with superior vena cava obstruction should be treated aggressively.

REFERENCES