Surgical treatment strategy for thymic tumor invading superior vena cava

Objective: To explore the surgical treatment strategy for thymic tumor involving the superior vena cava. Methods: We collected cases of thymic tumor involving the superior vena cava that underwent surgical treatment at our center between January 2016 and June 2021. The cases were classified into the following three types according to the location and extent of thymic tumor involvement in the superior vena cava. Type I (25 cases): if the tumor only involved the left or right innominate vein, resection of the innominate vein or right innominate vein was sufficient, and artificial revascularization was not required (Figure A). Type II (2 case): if the tumor involved less than 30% of the superior vena cava lumen, superior vena cava angioplasty could be performed, that is, only part of the superior vena cava involved by the tumor is removed and the defect is repaired by direct suturing or using patches such as autologous pericardium for superior vena cava repair (Figure B). Type III (30 cases): for those whose tumor involves more than 30% of the lumen of the superior vena cava, a brachiocephalic vein - right atrial appendage single artificial vessel reconstruction is performed first (Figure C1), followed by an extended resection of the tumor, which includes the tumor and the tumor-involved superior vena cava. Type III can be further divided into two subtypes. Type IIIa: for tumor involvement above the arch of azygos vein, the arch of azygos vein is preserved (Figure C2); Type IIIb: for tumor involvement at or below the arch of azygos vein, the tumor is resected together with the arch of azygos vein (Figure C3). This study was designed to evaluate the surgical treatment strategy and outcome of thymoma involving the superior vena cava.

Results: Twelve cases of type I were resected by subxiphoid thoracoscopy, and 13 cases were resected by median sternotomy. Type II cases were treated with median sternotomy, and all 2 patients had no perioperative complications. All type III cases were treated with median sternotomy, and all had a brachiocephalic vein - right atrial appendage single artificial vessel reconstruction first before resection of the tumor and superior vena cava, followed by extended resection of the tumor and the invaded superior vena cava. The mean operative completion time was 233.4 ± 50.6 minutes, the mean intraoperative bleeding volume was 786.7 ± 881.4 ml, the mean postoperative drainage tube retention time was 11.0 ± 4.7 days, and the mean postoperative hospital stay was 20.0 ± 24.1 days. There were 3 perioperative deaths, 2 secondary surgeries, and 1 incisional infection. All patients were treated with warfarin or rivaroxaban for long-term anticoagulation after surgery, and there was one case of artificial vessel obstruction, and the long-term patency rate of artificial vessel was 96.7%. The median follow-up time of all 56 patients was 15 months, and the progress free survival rates were 88.7%, 78.3%, and 65.5% at 1, 3, and 5 years after surgery, respectively, and the overall survival rates were 94.6%, 88.6%, and 82.7% at 1, 3, and 5 years after surgery, respectively.

Conclusions: The complete resection of thymoma involving the superior vena cava can be achieved by selecting the appropriate surgical approach through proper type of the patient, thus improving the safety of operation and prolonging the survival time of the patient.

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