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En Bloc Resection for Lung Cancer Involving Left Atrium

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En bloc resections for patients with left atrium involved by lung cancers were evaluated in the 8 patients in terms of the operative procedure, the indication and the outcome. In one patient, application of extracorporeal circulation was accomplished to perform a complete resection and also to permit patch plasty to compensate volume diminution. En bloc resection on extracorporeal circulation is recommended for patients with limited cancer extension of squamous cell carcinomas without nodal involvement.

In addition, emphasis has been placed in the genesis of double cancer in follow-up study according to improvement of surgical result in reflection of susceptibility to carcinomas in other organs.

Introduction

For the purpose of obtaining more improved surgical result, attention has been paid to aggressive surgery for advanced lung cancer patients involving the mediastinal organs.

Recently perioperative circulatory supportive device has been advanced with practical ease and safety. As a result, surgical approaches to the heart and the great vessels are prevalent in clinical use.

Involvement of the wall of the left atrium is one of the targeting lesions of the surgical indications. In the case of left atrial involvement, there are two cases of direct cancer invasion through the wall of the pulmonary vein and of polypoid lesion protruding and occupying the left atrial cavity.

Patients

Eight patients underwent partial resection of the left atrial wall, who included patch closure for a defect of the atrial wall in one. The patients' ages ranged from 61 to 69. Main chief complaints were respiratory distress such as sputum and hemoptysis. No symptom was only in one. Primary lung cancers were situated in right lower lobes of which four were in the segments of the lower lobes, \( S^o \) and \( S^w \) in each two, respectively. Histological types were squamous cell carcinomas in all eight patients. According to TNM factor, \( T_3 \) were in 4 and \( T_4 \) in 4, \( n_0 \) in 7 and \( n_1 \) in 1, \( M_0 \) in 8, respectively.

Preoperatively sonographic findings were unclear in the border between of the left atrial walls and the left pulmonary veins. In one, polypoid mass within the left atrial cavity was clearly defined by preoperative sonography as well as angiography. On the other hand, preoperative angiography revealed the finding of obstruction and interruption of the inferior pulmonary veins. The operative procedures were pneumonectomy in 4, lobectomy in 2 and bilobectomy in 2, respectively.

At resection of the left atrial wall, a Satinsky clamp was used for holding the resected margin of the atrial wall. No patient sustained hemodynamic changes during a clamping period except for temporary appearance of supraventricular arrhythmia. In the case of applying clamp method, left atrial wall was resected at maximum 3 cm apart from the attachment of the pulmonary vein. In older patients, it was common that the left atrium was distended with fragile wall tissue that gentle handling of clamping was essential for ensuring surgical security.

One patient with polypoid tumor in the cavity of the left atrium underwent patch repair for defect after resection of the left atrial wall under the aid of extracorporeal circulation. When reduced one-third of left atrial cavacity, patch repair is recommended to maintain stroke volume. The surgical outcome was related to how to prevent occurring local recurrence and distant metastasis. Local recurrences occurred from 3 months after surgery. On the other hand, hematogenous metastases to the bone and the brain were seen 8 to 11 months following surgery. The other causes of deaths were in association with respiratory failure due to pulmonary dysfunction and pneumonia.

One patient who underwent resection of polypoid lesion with an aid of extracorporeal circulation survived one year and 7 months with subsequent resection of rectal cancer termed so-called double cancer at the 9th month after the initial operation. This patient showed the significance of the surgical treatment for \( T_4 \) lung cancer with the use of extracorporeal circulation, suggesting that \( T_4 \) lung cancer involving the left atrium be a good candidate for surgery
with good selection.

Discussion

Recent advances in surgery have made it possible to extend the indication of the surgical treatment for T4 lung cancer including the left atrium involvement.

In such a case, the use of extracorporeal circulation was mandated except for application of a Satinsky clamp.

Application of extracorporeal circulation consists in the cases of 1) extensive invasion on the wall of the left atrium which is impossible to apply the hemostatic clamp and 2) high risk of shower embolism by fragmentation of polyoid carcinoma tissues by handing of hemostatic clamp.

Needless to say, the advantages of the use of extracorporeal circulation were 1) ensuement of bloodless operative field without clamping maneuver, 2) prevention from fragmentation of polyoid tumors, 3) reduction of bloodless state until recirculation of bled blood. The drawback of the use of extracorporeal circulation is 1) a risk of bleeding diathesis in various organs due to hemolysis, 2) volume overloading by diluted blood circulation, 3) dissemination of tumor cells mixed with circulating blood.

The major item is dissemination of tumor cells by recirculation into the circuit when the tumor mass is exposed into the blood stream. Ensurnent of the left atrium is limited to a 35 to 40% resection of left atrial cavity. And also it is assumed that a resection of the left atrial wall should be limited within 6 cm long.

However, patch plasty for the defect of left atrial wall after resection serves to exert in compensation for reservoir function. On the other hand, it has become obvious that booster-pump function fails to be expected.

Recently, bio-inert material has been developed to adapt snugly without any degenerative change. The surgical outcome following combined resection with left atrial wall is not necessarily fair, not obtaining a long-term survivor, although Nishiyama has reported a 3-year-survival case. On the other hand, Takeuchi reported three out of eight patients with resection of the left atrial wall survived over 3 years after surgery. In squamous cell carcinoma, complete resection is mandatory for obtaining long-term survivors.

As far as the operation may be selected for the patient without nodal involvement, the surgical outcome is not necessarily pessimistic. A wide application of En bloc resection on cardiopulmonary bypass is recommended for patients with carcinomas extending to the left atrium.
References


