

Simultaneous Combined Resection with Trachea, Bronchus and Aorta for Carcinoma of Thoracic Esophagus

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ABSTRACT : Clinical experiences with combined sleeve resection of the trachea, bronchus and aorta with esophagectomy for esophageal cancer were reported in 6 cases including concurrent combined resection of the aorta and left main bronchus in one.

- 1) These cancers were advanced ones, showing nodal involvement of n2 in one, n3 in three and n4 in two.
- 2) In the three cases of combined resections of the aorta, it was made via left thoracotomy using preceding bypass with artificial vessel. There was no complication related to vascular surgery.
- 3) It must be prudent to determine the extent of the resection for involved trachea on the basis of an experience having recurrence at anastomosis.
- 4) It was sure that surgical outcome of combined resection was not necessarily satisfactory but improvement of it would be expected by avoiding early postoperative complication with meticulous postoperative care.
- 5) Based on our clinical experience with appearance of early lung metastasis following surgery, it is emphasized that potent multidisciplinary treatment is mandatory for improvement of the surgical result.

INTRODUCTION

Palliative surgery for carcinoma of the esophagus to relieve a complaint of dysphagia is not infrequently required and also it is necessary for avoiding a catastrophe of rupture from the involved aorta by direct cancer infiltration,

whenever curative surgery is not applicable. A combined resection of the involved adjacent organ with esophagectomy is indicative for alleviation of a complaint of dysphagia as well as for maintainance of a pleasant life. However, the combined resection with the wall of the descending aorta, the trachea and the bronchus should be restricted for its use because of grave

surgical insults.

The purpose of the present study is to overcome the operative inadequacies and to ensure its safety with the general development of a combined sleeve resection of the trachea, the bronchus and the descending aorta with esophagectomy.

PATIENTS

During the past 14 years from January 1973 to April 1987, Ninety-two patients with esophageal cancer were operated upon at our clinic. According to their locations, CePh was seen in (5.4%), Iu in 10 (10.8%), Im in 53 (57.6%), Ei in 20 (21.7%) and Ea in four (4.3%) respectively. Cancer lesions extending across the adventitia (a3) were seen in 30. Their ages ranged from 49 to 71, 24 were men and six were women, indicating that men were more frequently affected than women.

The locations of these lesions were Iu in eight, Im in 19 and Ei in three. The cancer lesions involving the adjacent structure were mostly located in Iu and Im. In view of the involved organs, the aortic wall was affected in 15, the main bronchus in six, the trachea in four, the lung tissue in five, the pericardium in three, the diaphragm in two, the pleura in one and the vertebrae in one. It is strongly suggested that the walls of aorta, trachea and bronchus tends to involve more frequently.

We have experienced six cases of esophageal cancer who underwent the circumferential resection of the descending aorta in three, the trachea in one and the bronchus in two with esophagectomy. The patients with a partial resection of the adventitia for involved aortic walls were excluded from this study. One of the six cases received the concomitant sleeve resections of the aorta, the trachea and the brouchus. The ages of the six patients were between 51 and 69 years. The cancer locations were Iu+Im in three and Im in three. The grades of nodal involvement were n2 in one, n3 in three and n4 in two respectively, demonstrating the far advanced cancers of Stage III or more. The trachea was resected in one, the main bronchus in three and the descending aorta in three respectively, including a concurrent combined resection with the left main bronchus and the descending aorta in the same one. In another a partial resection of the 5th and 6th vertebrae was combined. In these six cases, one stage operation of simulutaneous reconstruction following esophagectomy was performed as shown in Table 1.

In patients who underwent a combined resection of the descending aorta, temporally bypasses between the subclavian artery and the distal descending aorta were instituted in the same operative field of the left thoracotomy in two and permanent bypass was preceded in one to ensure the blood supply to the abdomen

Table 1. Six patients with combined resection of aorta, Trachea and bronchus with subtotal esophagectomy

| patients | age | sex | location | nodal meta | curability | operation | prognosis |
|----------|-----|-----|----------|------------|------------|---|---------------------------------------|
| MK | 68 | M | IuIm | n3 | C1 | esophagect. sleeve R of 1-main Br | 1M died from bronchopulmonary fistula |
| UT | 65 | M | Im | n3 | C0 | esophagect. sleeve R of desc. Ao | 6M died of debility |
| SM | 65 | F | Imlu | n3 | C1 | esophagect. sleeve R of r-main Br | 12M died of recurrence anastomosis |
| VT | 64 | M | Imlu | n2 | C1 | esophagect. sleeve R of 1-main Br & desc. Ao | 1M died from bile peritonitis |
| TS | 54 | M | Im | n4 | C1 | esophagect. sleeve R of Tr | 3D died from acute renal failure |
| FS | 58 | F | Im | n4 | C1 | esophagect. sleeve R of desc. Ao & partial R of vertebrae | 2M died from lung meta |

esophagect.:esophagectomy R:resection Tr:trachea Br:bronchus desc.Ao:descending aorta

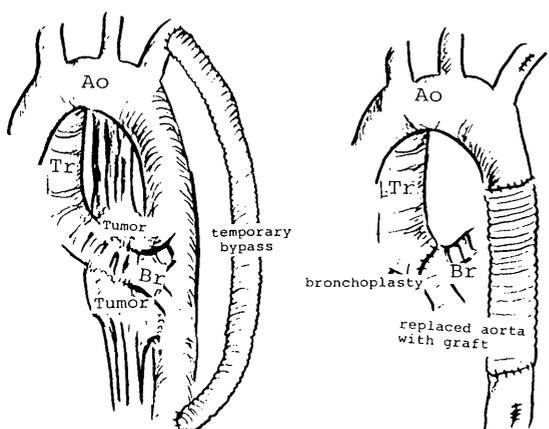


Fig. 1 Schematic illustration of the replacement of the descending aorta with bronchoplasty in Case 4.

and lower extremities during performing the resection of the involved aortic wall and the replacement with artificial graft (Fig. 1).

There were no complications related to the replacement of the descending aorta such as infection and anastomosis insufficiency.

Surgical specimens of the descending aorta indicated that cancer infiltrations had extension beyond the lamina elastica externa in all three cases. The membranous portion of the trachea and the bronchus was mainly involved, partly invading into the lateral cartilaginous portion of the trachea. The patients underwent the resections of the trachea of five cartilaginous rings (2.5 cm long), left main bronchi of 3.2 and 3.4 cm long and right main bronchus of 2.6 cm long. On the basis of our clinical experiences with a3 esophageal cancers which involved the adjacent structures, 20% (three out of 15) of involved aorta, 25% (one of four) of affected trachea and 50% (three of six) of diseased bronchi were operated upon by combined sleeve resections as shown in Table 2. Such an aggressive indication for combined resection is a reflection of advances in thoracic surgery. The outcome, however, was not satisfactory so far. One died of massive hemoptysis due to pulmonary-bronchial fistula at one month after surgery. In fact, it was indicated that wrapping with free pericardial graft failed to

Table 2 Involved adjacent organ by a3 esophageal cancer in 30 cases

| Involved organ | No patients (%) |
|----------------|-----------------|
| aorta | 15 (50.0%) |
| main bronchus | 6 (20.0%) |
| trachea | 4 (13.3%) |
| lung | 5 (16.6%) |
| pericardium | 3 (10.0%) |
| diaphragma | 2 (6.6%) |
| pleura | 1 (3.3%) |
| thoracic | 1 (3.3%) |

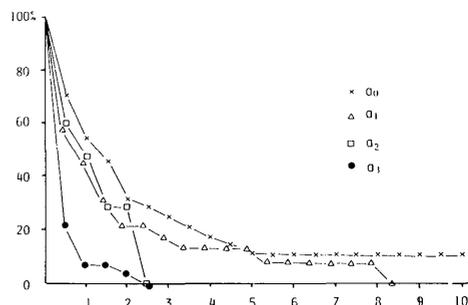


Fig. 2 Survival of esophageal cancer (30 cases) in accordance with the depth of cancer infiltration.

prevent such complication, suggesting that management of covering with the pericardium was occasionally inadequate.

Another was lost by recurrence at tracheobronchial anastomosis one year after surgery. The other succumbed to postoperative acute renal failure. The other postoperative deaths were associated with bile peritonitis secondary to postoperative cholecystitis because of delay in the management of percutaneous cholecyst drainage. Such a complication should be avoided by postoperative cares. Recurrences were seen in the lung at two months, the mediastinum at six months and the tracheal anastomosis at 12 months following surgery respectively. According to the depth of cancer infiltration, Fig 2 demonstrated changes in the survival rate. There was no survivor of more than three years among a2 and a3 patients and the prognosis of a3 patients was inferior to that of a2, showing that the survival of more than six months in a2 and a3 patients was nil. Experience of combined resection of involved adjacent structures was too few to evaluate its effect.

DISCUSSION

With advances in thoracic surgery, the indication for surgical treatment for esophageal cancer has become extended^{1)~7)}. Application of combined resection for involved adjacent structures has become a clinical consideration for establishing oncologic radicality. Needless to say, it must be prudent to use such an aggressive operation for advanced cases and satisfactory outcome is not necessarily anticipated. However, it is apparent that successfully combined resection is beneficial in relieving the patients from distress of dysphagia and from attack of repeated obstructive pneumonia as well as in avoiding a catastrophe of rupture of the involved wall of the aorta and massive hemoptysis related to suffocation.

To determine the operative indication for combined resection preoperatively, CT scan is most helpful. Since combined resection of the trachea for esophageal cancer was first reported by THOMPSON²⁾ in 1973, a few reports have become published^{1) 3)}. It should be borne in mind that combined resection of the trachea with esophagectomy offers a detrimental condition for healing of tracheal anastomosis due to (1) no supporting tissues for the posterior wall of the trachea and (2) unavoidable interruption of feeding vessels to the lateral wall of the trachea by the surgical procedures of esophagectomy and mediastinal node dissection. From our clinical experience, it is emphasized that the site of tracheal anastomosis should be wrapped by much more rich tissues than the pericardium such as the latissimus dorsi or the major pectoralis muscles⁸⁾ and the omentum⁹⁾ to prevent a complication of pulmonary-bronchial fistula.

On the other hand, combined resection of the aorta with the digestive tract is now under debate on account of high frequency of postoperative complications of infection leading to a fatal course and it has been restricted for its use¹⁰⁾.

It is well known that if cancer infiltration involves the wall of the aorta, a catastrophe of rupture is more likely to take place.

An explanation for the mechanism is that can-

cer infiltration to the aorta produces thrombosis of the vasa vasorum which results in poor feeding blood flow and tends to rupture.

When cancer infiltration is limited to the superficial layer of the aorta, partial resection of the involved adventitia sometimes offers oncologic radicality. In such a case, histologic finding revealed that the site of adhesion of cancer lesion is not infrequently composed of no cancer cell infiltration, reflecting an inflammatory response.

On the contrary, it is the rule that it is impossible to try to perform partial resection of the adventitia when cancer lesion is extending outside the esophagus because of a presence of cancer infiltration extending across the lamina elastica externa. The preoperative findings of CT scan are more helpful in determining the depth of cancer infiltration to the aorta to a great extent.

Based on a few of our clinical experiences, know frequent complication of infection seems to be less than would be expected.

To avoid instituting a temporary bypass in the same operation field and to minimize the complication of infection, extraanatomic bypass is prepared prior to thoracotomy. The main drawback to this procedure is that it sometimes is to be wasted if combined resection is not applicable.

In view of our clinical experience, combined resection of trachea, bronchus and aorta is technically feasible. It, however, is necessary that postoperative fatal complications should be prevented by early detection and proper management. It is sure that the operative death due to bile peritonitis and acute renal failure reported in this report could be avoided. Surgeons should keep in mind that combined surely provides a great operative insult which is sufficient to provoke various kinds of postoperative complications. Moreover, a complete mediastinal node dissection and local excision of the tumor mass are required for enhancing oncologic radicality.

On the other hand, it is emphasized that postoperatively multidisciplinary therapy is essential for improvement of surgical outcome as well as for prevention of distant metastasis. Surgeons should accumulate the experiences

with combined resection to elucidate its significance from now on.

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