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Resection of Tracheal Bifurcation, the First Japanese Case

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The first case of carinal resection in Japan was reported. It was found that we had experienced the first Japanese case in 1957.

On the basis of clinical experience with the first Japanese case, advance in tracheobronchial surgery was analyzed in terms of various factors directly related to death.

In conclusion, it is confident to emphasize that the development of instruments including suture materials surely contributes to the advances and prevalence in tracheobronchial surgery.

Introduction

With the advances in thoracic surgery, the outcome of tracheobronchial surgery has been improved and its indication is widened in the field of tracheobronchial surgery. A wide resection of the trachea is now limited to a possible range of direct suturing. Therefore, surgeons have awaited the development of an ideal artificial trachea.

In particular, it is focused on the questions solved with respect to postoperative care, the extent of resection, the influence of denervation and the modality of reconstructive procedures when tracheal bifurcation is resected and reconstructed.

Yamaguchi analyzed 103 cases collected by a nationwide questionnaire survey in 1984, and we found that our first case was the first Japanese case of resection of tracheal bifurcation. The purpose of this study is to report the first Japanese case of a resection of tracheal carina and review the steps of the development of tracheobronchial surgery.

Patients

The patient, a 49-years-old male, was admitted to our clinic with severe cough and sputum since January in 1957. Since March 1957, he has complained of bloody sputum with exertional dyspnea. A chest XP film showed an abnormal shadow in the right hilum of the lung, which was diagnosed as lung cancer. On March 14, 1957, semi-emergency operation was done to eliminate dyspnea. Right thoracotomy was performed through posterolateral approach at the 5th ICS. The tumor mass, $5 \times 5$ cm in size, was located in the hilum of the lung. There was no cancer invasion to SVC and the pericardium.

The tumor involved the main bronchus, posterior portion of the carina, and cancer infiltration reached into the left main bronchus.

The carina, including two rings of the trachea and two rings of the left main bronchus, was removed with the right lung. Intraoperative respiratory care was made via endotracheal tube reaching through the operative field. The distal trachea was anastomosed to the left main bronchus as
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Fig. 2. Schema of the operative procedure

shown in Fig. 2. The tracheobronchial anastomosis was performed by using silk as the suture material and three suture knobs were intraluminally left at the left lateral wall of the trachea located far away from the operator. The other sutures were tied outside the tracheal wall. He complained of severely impaired expectoration which needed aspiration by direct vision using bronchoscopy.

At that time, only rigid bronchoscopy was prevalent and fiber bronchoscopy was not available. Therefore, it was difficult to aspirate sputum from the trachea by using rigid bronchoscopy because of patient's distress and insufficient evacuation of sputum. Even at night, frequent aspiration of the sputum by using bronchoscopy was required in spite of technical difficulty.

At day 13, he expired of pneumonia with a symptom of tracheal stenosis. At autopsy tracheobronchial anastomotic site was edematous and viscous sputum was sticking to the suture which was leaving inside the tracheal lumen. There was nothing of histological cancer residue at anastomosis and the bronchus. Reconstructed lung revealed congestion with less aeration as shown in Fig. 3. The histologic examination showed an inflammatory finding with cell infiltration and no cancer residue.

Discussion

The operative procedures following resection of the tracheal carina have been devised as sleeve pneumonectomy, double barreled anastomosis and side-to-end anastomosis between the trachea and bronchus.

According to a nationwide survey by Yamaguchi, 103 cases with carina resection were collected, of whom 27 patients underwent right sleeve pneumonectomy and eight patients received left sleeve pneumonectomy.

We had experienced with the first Japanese case who underwent carinal resection. We had not reported hitherto.

When viewed from the developmental steps of tracheobronchial surgery, it was confirmed that the feasibility of reconstruction following carinal resection was warranted in the report of this case by using endotracheal tube without an aid of high frequency ventilation method.

Fig. 3. Anastomotic site was shown exposing the suture material of the silk in a one-quarter circumference at autopsy

However, the use of endotracheal tube for intraoperative respiratory care provides availability of carinal resection and offers the demerits of limited operative field to warrant carinal surgery. In this reported case, it was difficult to suture the tracheal wall on the mediastinal side by using endotracheal tube. For this reason, we could not help leaving the suture knob inside the tracheal lumen. This fact ensured sticking vicious sputum to the suture knob to make the lumen narrow as well as to let sputum to accumulate. In addition, denervation by carinal resection played a key role in reduction of cough reflex and retention of sputum.

Furthermore, we had nothing but silk as the suture material at that time. If we had absorbable suture material, the suture knob left inside the tracheal lumen would not play a detrimental role in impairment of sputum expectoration and adherence of vicious sputum.

Tsuboi reported that there is no trouble to leave suture material inside the tracheal lumen as far as absorbable suture material may be used.

In this case, if absorbable suture materials were improved, we would have made a success in the first Japanese carinal resection.
At autopsy, anastomotic site was edematous on gross appearance. It is assumed that the use of silk for anastomosis resulted in severe foreign body reaction around the site of anastomosis and the use of silk for anastomosis was one of the attributable factors to death in this case. From the standpoint of the cause of death in this first Japanese case of carinal resection, it is confident that the development of surgical instruments including suture material contributed to the advances in tracheobronchial surgery.

References