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ASADA, Sakae

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SUCCESSFUL REMOVAL OF A CENTRAL BRONCHOGENIC CARCINOMA UTILIZING CARDIOPULMONARY BYPASS

Sakae ASADA, Takeyoshi YOSHIDA, Hiroshi SATO
and Kyoichi OGAWA

*Department of Surgery, Division II,
Kobe University School of Medicine*

Sakae ASADA, Takeyoshi YOSHIDA, Hiroshi SATO and Kyoichi OGAWA. *Successful Removal of a Central Bronchogenic Carcinoma Utilizing Cardiopulmonary Bypass.* Kobe J. Med. Sci. 13, 123-128, June 1967 — In performing a radical operation for lung cancer, that is, for the division of the bronchus or trachea above the zone of carcinomatous extension and for complete removal of regional lymph nodes together with mediastinal soft tissue, intrapericardiac dissection pneumonectomy has proved to be the logical technique. But, when a tumor is located at the central portion of the tracheobronchial system, resection of the carina or the lower third of the trachea becomes necessary.

This report presents a case of successful removal of a central bronchogenic carcinoma, in which cardiopulmonary bypass was used for en bloc resection of the carina and left main stem bronchus together with the entire left lung and local lymph nodes metastases.

We are not aware of any such previous use of cardiopulmonary bypass in this country, and the usefulness of cardiopulmonary bypass in the field of pulmonary surgery is emphasized.

INTRODUCTION

Although the efficacy of cardiopulmonary bypass for open heart surgery is well established, its application in the field of lung operations has not been stressed, because one lung may undergo repair while the other supports ventilation. However, maintenance of ventilation may be inadequate with extensive resections of the trachea or carina. When an operation is indicated in this portion of the respiratory system the pump oxygenator can make the procedure easy and feasible.

It is the purpose of this report to present a case of central bronchogenic carcinoma in which cardiopulmonary bypass was used for resection of the carina and left main stem bronchus together with the entire left lung. We are not aware of any such previous use of the "heart-lung" machine in this country.

CASE REPORT

■ a 53-year-old man, was admitted to the surgical department of the Kobe University Hospital complaining of dyspnea and cough on July 15th last year.

For 16 months there had been episodes of nonproductive cough, with occasional wheeze, fever and blood streaking.

Physical examination showed a healthy man with no abnormal findings except for distant breath sounds over the entire left hemithorax. Roentgenograms of the chest revealed the finding of left lung atelectasis (Fig. 1). Bronchoscopy disclosed the trachea being pulled to the left side and a mass almost completely occluding the left main stem bronchus lumen (Fig. 2). Angiocardiography disclosed that the superior caval vein, pulmonary artery and veins were remarkably dislocated to the

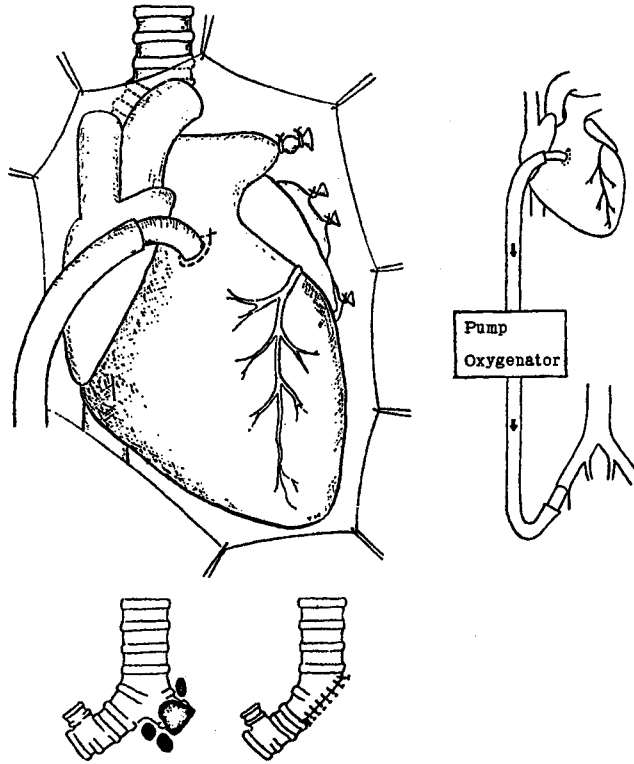


Fig. 4. Schema of the Operation.

left side (Fig. 3). The pathologic examination of the biopsy specimen obtained at bronchoscopy showed an epidermoid type of bronchogenic carcinoma, but scalene lymph node biopsy revealed no metastasis of the cancer.

The vital capacity was 2450 cc, being 68% of the estimated normal value.

Operation was performed on July 29th. The left thorax was entered through the 4th intercostal space. There were neither pleural adhesions nor pleurisy. The left lung showed a complete atelectasis. The trachea and the left main stem bronchus were dislocated to the left. A hen-egg-sized tumor was palpated in the left main stem bronchus. The pericardium was opened longitudinally behind the phrenic nerve, and the left pulmonary artery and veins were dissected intrapericardially.

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Then, several lymph nodes, found along the left main stem bronchus and under the carina, were removed. The tumor seemed to extend to the carina. Therefore, partial resection of the carina together with the left bronchus and lung was considered to be necessary. Although endobronchial anesthesia was attempted, inserting an air tight tube into the right stem bronchus to resect the carina without perfusion, immediate appearance of respiratory disturbances and deep cyanosis prompted the use of extracorporeal circulation. The outflow tract of the right ventricle was cannulated and the right femoral artery was tubed in the groin. Cardiopulmonary bypass with bubble oxygenator and De Bakey type of roller pump primed with 2500 ml of 5% dextrose solution was instituted. During 30 minutes of partial perfusion the lower and left part of the carina was resected together with the left stem bronchus and the entire left lung. The tracheal stump was closed with interrupted Nylon sutures (Fig. 4). The perfusion was discontinued, the wound closed and a tracheostomy performed. Fig. 5 shows the resected left lung containing a large mass. Pathohistological examination revealed an epidermoid cancer (Fig. 6). Metastasis was found in a lymph node which was located under the carina, but the cut stump of the carina did not show the infiltration of carcinoma.

The postoperative course was quite uneventful. Bronchography performed on the 23rd postoperative day disclosed the tight repair of the carina. The patient was discharged on the 45th postoperative day (Fig. 7).

DISCUSSION

The principle of the surgical treatment for bronchogenic carcinoma is the en bloc removal of the primary lesion and any local extension. That is, division of the trachea or bronchus above the zone of microscopic extension and complete removal of regional lymph nodes together with mediastinal soft tissue should be attempted.²⁾ For the purpose of performing the latter procedure, intrapericardiac dissection pneumonectomy¹⁾ has proved to be the logical technique, since it was done by Kirklin⁶⁾ and Higginson⁵⁾ in 1953.

When a tumor is located at the central portion of the tracheo-bronchial system, resection of the carina or the lower third of the trachea becomes necessary, which presents surgeons with the problem of maintaining ventilation during the time of operation. Green⁴⁾ recommended the use of so-called endobronchial anesthesia, inserting an air tight tube selectively into either of the main stem bronchi while surgical repair is carried out on the opposite side. We had also used this endobronchial anesthesia in several cases, but we experienced some unpleasant complications such as air leakage, coming out of the tube through the tracheal incision and anoxia.⁹⁾ We have felt that the resection of the carina or the trachea can not be satisfactorily done under endobronchial anesthesia. In this case, also, respiratory disturbance and cyanosis appeared by insertion of a tube into the right stem bronchus.

As extracorporeal perfusion has become increasingly familiar to us,³⁾ we have used this method for the resection of the carina in this case. By this method ventilation could be discontinued during perfusion, the excision of the lesion and

the reconstruction of the trachea could be performed accurately in the still operative field.^{7) 8) 10)}

Postoperative bleeding was not so remarkable, in spite of the administration of heparin during the procedure. Now 8 months after the operation, our patient is free of symptoms and has returned to his daily work.

SUMMARY

Successful removal of a central bronchogenic carcinoma utilizing cardiopulmonary bypass is reported. The usefulness of cardiopulmonary bypass for resection of the carina and trachea is emphasized.

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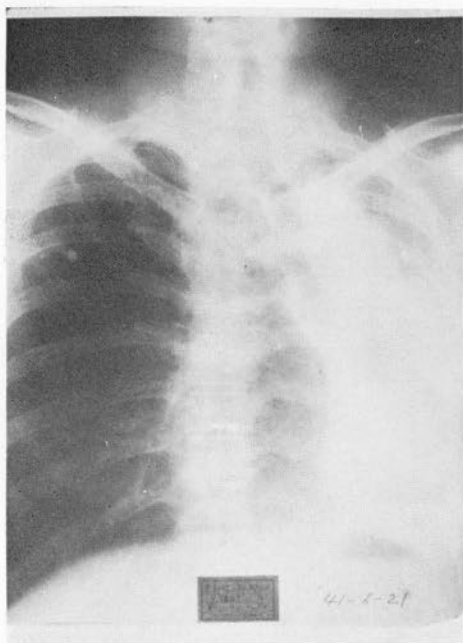


Fig. 1. Preoperative Chest Roentgenogram.

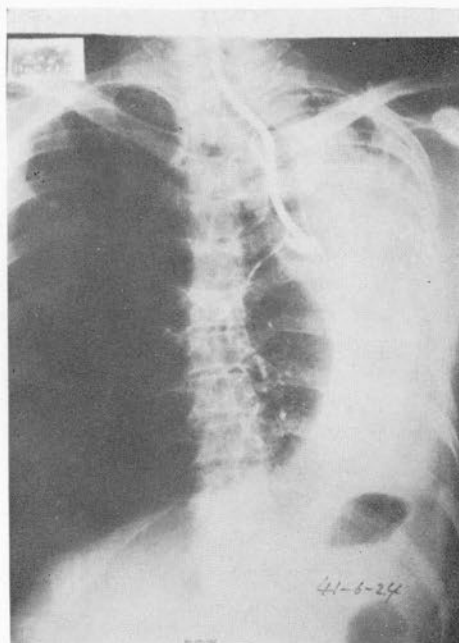


Fig. 2. Preoperative Bronchogram.

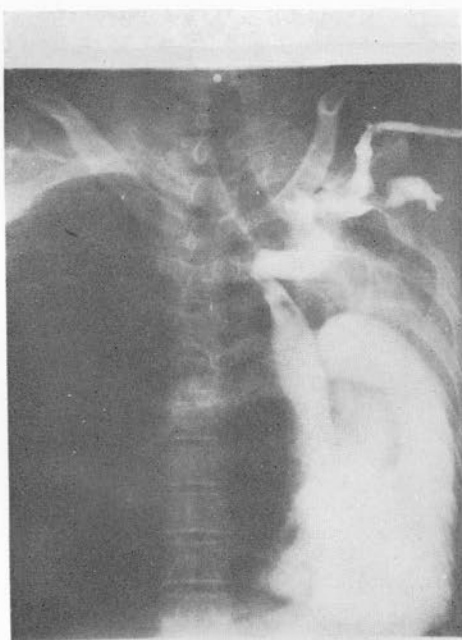


Fig. 3. Preoperative Angiocardiogram.

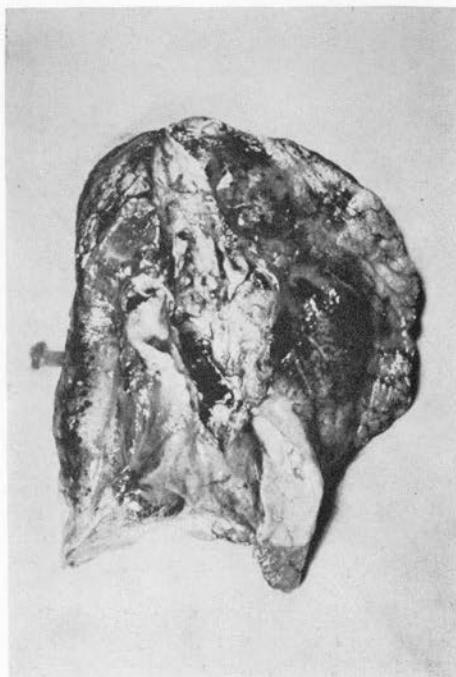


Fig. 5. Resected Specimen.

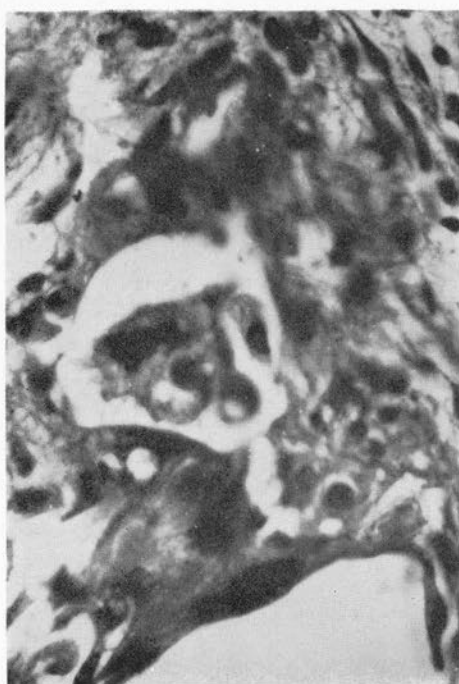


Fig. 6. Photomicrograph of the Tumor:
Squamous Cell Carcinoma.

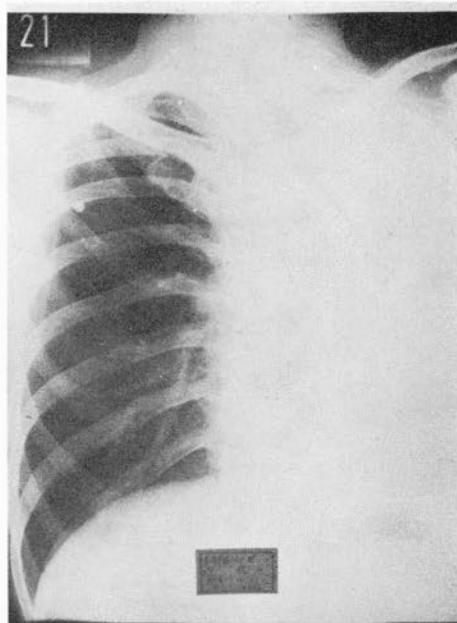


Fig. 7. Postoperative Chest Roentgenogram.