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Surgical Experience with Pulmonary Thromboembolism

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Surgical experience with acute pulmonary thromboembolism was reported and reviewed in the pathogenesis and surgical indication. A past history which underwent surgery for lung cancer was particular to this patient, suggesting a presence of tumor embolism.

In conclusion, pulmonary thromboembolism is not necessarily related to preceding deep thrombophlibitis and drug therapy should be prescribed as soon as a diagnosis was made. In drug therapy was ineffective in alleviating their complaints, surgical indication should be taken into consideration. The aid of the support by extracorporeal circulation is of great use in the gain of dry operative field.

Introduction

The high incidence of pulmonary thromboembolism has been reported in Europe and United States of America despite the fact that the case reports of pulmonary thromboembolism are frequently presented. According to the collection of Japan autopsy reports, the frequency ranged 2.31[1] to 2.66[2] percent in contrast to 20 to 30 percent[3] in Europe and United States of America. The main treatment includes heparin and warfarin of anticoagulant and urokinase of fibrinolytic agent. The surgical treatment is indicative of no effective patients for drug therapy. The surgically successful patients have sporadically been reported in Japan. Improvement of surgical outcome require restrict selection of patients and judicious determination of surgical indication.

Successful experience with surgery is reported on the basis of the pathogenesis and surgical indication.

Case Report

A 55 year-old male complained of dyspnea at using the stairway since March,1994 and the complain has gradually increased with speech disturbance and transient syncope attack on April 13, 1994. He was admitted to the Nagasaki University Hospital and pointed out lodgement of emboli in the bilaterally main pulmonary arteries on CT with a dignosis of pulmonary thromboembolism. Preoperatively drug therpy was initiated with heparin and urokinase. However, the drug effects were not significant so that surgical indication was taken into cosideration.

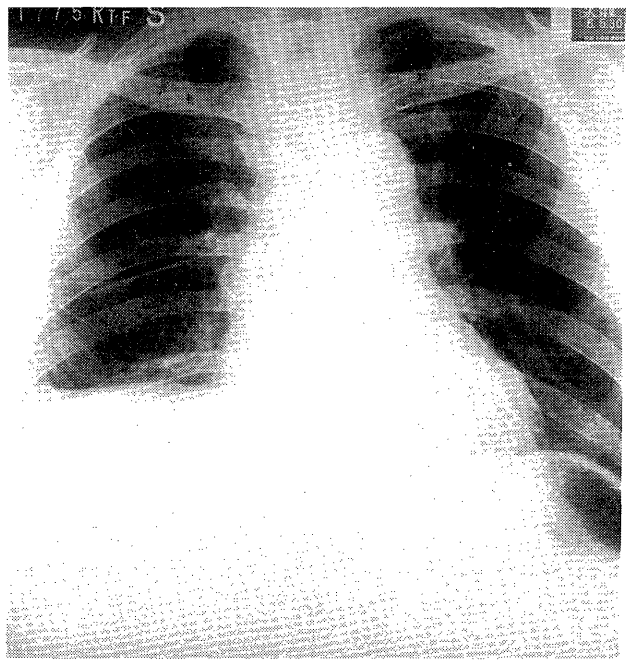

Fig. 1 Preoperative chest XP film, showing so called Knuckle sign

He underwent operation for lung cancer (stage II $N_2 M_0$ and prescribed the adjuvant therapy of UFT and CDDP in September,1993. He had no history of deep thrombophlebitis except the familiar history that his brother complained of deep thrombophlebitis in the legs.

Chest XP film (Fig 1) showed enlargement of bilateral hilus and poor pulmonary markings with a defect of the pulmonary markings in the left lower field (Knuckle sign). Chest CT and MRI (Fig 2) demonstrated a presence of thrombus obstructed right lower branch of the right pulmonary artery in addition to partial stenosis of the left main pulmonary artery which was suggestive of the presence of embolus. The pulmonary perfusion scintigram (Fig 3) indicated the presence of interspersed cold spots in whole lung field in spite of full filling of ventilation scintigram. Pulmonary angiogram (Fig 4) indicated a blockage of right lower lobe artery and spearse filling of left upper lobe. Venogram in the both legs showed good

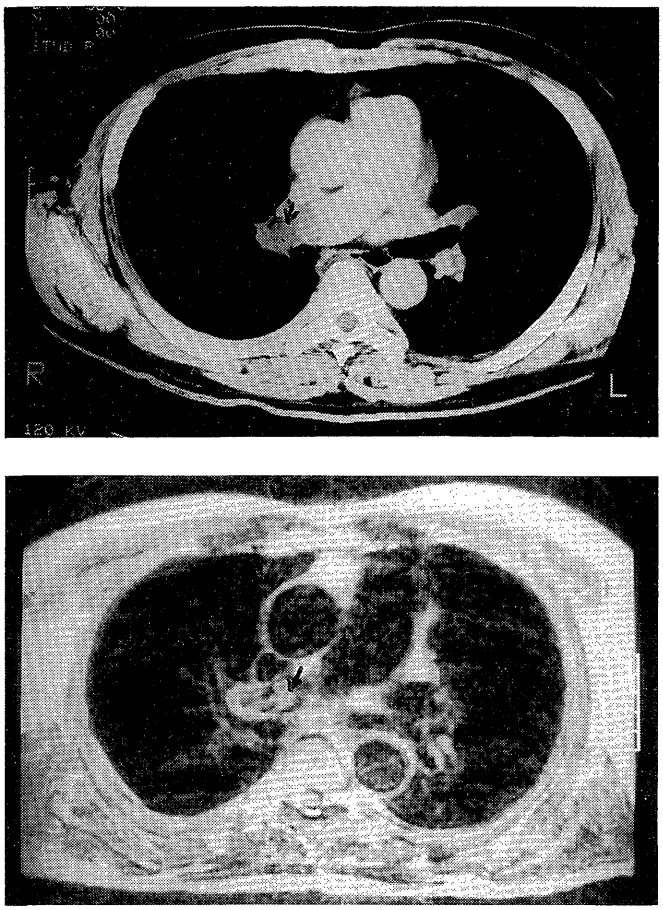

Fig. 2 Preoperative chest CT (upper) and MRI (lower), demontrating the presence of thromboembolism in the right main pulmonary artery (Arrow ↓)

Fig. 3 Preoperative ventilation (upper) and perfusion (lower), scintigrams, indicating scattered cold spots in perfusion scintigram despite normal ventilation one

filling without any filling defect.

Preoperative assessment indicated a presence of either thromboembolus without preceding thrombophlebitis or tumor embolus associated with previous lung cancer operation.

The operation was done with midsternotomy with an aid of extracorporeal circulation. The right main pulmonary artery was longitudinally opened and abration of white-adhered thrombus to the vessel wall which was situated in the branch of the upper and the truncus medius was carefully performed with minimizing injury to the endothelium as shown in Fig 5. Intraoperatively histological examination revealed fresh thrombus without a presence of malignant cells. After washing with saline-heparin solution, no residual thrombus was confirmed. Intraoperatively endoscopic inspection failed to detecte the existence of residual thrombus in the contralateral pulmonary artery in addition to Fogarty catheter maneuver. The patchy plasty for the incised pulmonary arterial wall was accomplished with horse pericardium. Weaning extracorporeal circulation was smooth and the heart beat was spontaneously resumed. Postoperative pulmonary angiogram (Fig 6) revealed no filling defect of right lower

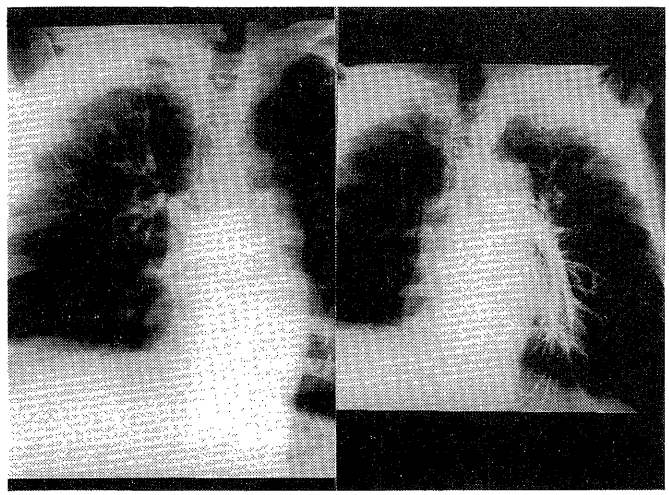

Fig. 4 Preoperative pulmonary angiogram, revealing filling defect in the right lower lobe artery (left) and faint filling in the left upper lobe artery

lobe artery which was defined preoperatively. His postoperative course was uneventfull and he discharged on postoperative day 26.

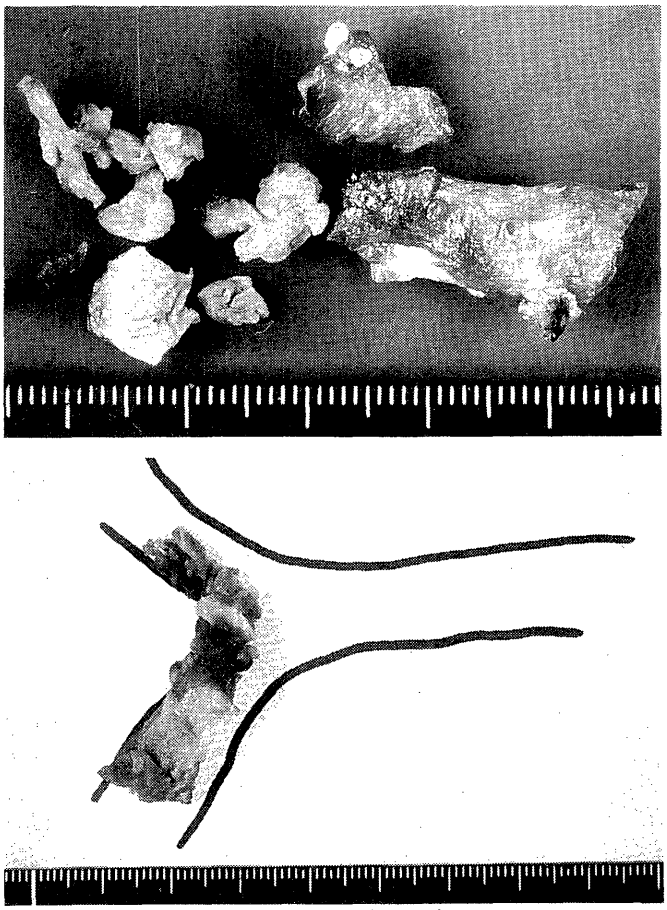

Fig. 5 Excised thromboemboli (upper) and their location was shown (lower)

Fig. 6 Postoperative angiogram, showing disappearance of preoperative filling defect in the right lower lobe artery

Discussion

Pulmonary thromboembolism is classified with wide (two or more lobal arteries) and semi-wide area (less than two lobar arteries) according to the lesion areas[4]. The prognosis was influenced by rapid abstruction of massive thrombus or repeat of reccurrent attacks[5]. The incidence of accompanying deep thrombophlebitis is reported to be one third of the patients and also low incidence is revealed in patients with chronic pulmonary thromboembolism. Kunieda[6] reported thirty nine percent in acute form and twelve percent in chronic form, respectively. It is especially noteworthy that pulmonary thromboembolism occurs more often in silent deep thrombophlebitis with no clinical manifestation of inflammation[3].

The past history undergoing surgery for lung cancer is peculiar to this patient. Preoperative CT assessment clarified that there was neither node involvement in the mediastinum which corresponded to a pathway of the pulmonary artery via the thoracic duct and the superior vena cava nor pulmonary metastasis which was suitable for a direct passage. It is well recognized that the predisposing factors of pulmonary thromboembolism were hemiplegia, heart disease, cancer and postoperative states. In this case, it could not be denied that this episode was associated with previous operation of lung cancer. We tend to image that fresh thrombosis seems to be soft reddish thrombus forming a cast. In this case, fresh thrombosis identified by intraoperatively histological examination was hard in consistence and white in color. as if it were organized thrombosis.

It is very rare that syncope attack at the initiation of pulmonary thromboembolism is not necessarily relevant to circulatory collapse as this case was. It is well known that the right heart has intolerance for high pressure as compared with the left heart and the maximum tolerable pressure of the right heart is as high as 40mmHg of the pressure of the pulmonary artery[7]. At occurrence of pulmonary thromboembolism, the pressure of the pulmonary artery is associated with rapid onset and spreading area of thromboembolism which is divided into two categories, large and small vessel types[8]. Large thrombus in large vessel causes circulatory collapse by obstruction of the pulmonary artery. In this case, preoperatively existing thrombus which brought partial stenosis on to the left pulmonary artery failed to be intraoperatively detected by using endoscope and Fogarty catheter. In addition, no presence of stenosis in the left pulmonary artery was revealed on postoperative CT and pulmonary angiography. It is extrapolated that pre-and postoperative use of anticoagulant and fibrinolytic agents exerted an effects on lysis of thromboembolism[9,10]. However, it is difficult to expect the effectiveness of drug therapy on the thromboembolism which firmly adhered to the endothelium even though it had been categorized into fresh thrombus as seen in this case.

There are many reports regarding lethal and impending patients with pulmonary thromboembolism. It is emphasized that precise diagnosis and application of PCPS (percutaneous cardiopulmonary supporting system)[11] are indispensable for improvement of the survival of this disease.

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