

Systemic Tumor Embolism After Pulmonary Resection For Lung Cancer

Masao TOMITA, Hiroyoshi AYABE, Katsunobu KAWAHARA
Ryuuichiro YOSHIDA, Hiroshi HASEGAWA, Satoru HASHIMOTO
Shigehiko ITO, Yutaka TAGAWA, Hiroyuki KUSANO
Akio KAWAGUCHI, Yukio SATO, Osamu SOEDA

1st Department of Surgery

Nagasaki University School of Medicine

Received for publication, June 18, 1986

A 70 year-old man with squamous cell carcinoma of the bronchus sustained a tumor embolization to the aortic bifurcation after pulmonary resection.

The restoration of blood circulation was surgically established. Reperfusion syndrome after surgery was fatal with sudden rapid rise of myoglobin and potassium concentrations in the serum. The complication of tumor embolization after pulmonary resection and reperfusion syndrome was briefly discussed.

INTRODUCTION

It is well known that small microscopic systemic embolism from carcinoma causes distant metastasis. In lung cancer the incidence is not infrequent. Catastrophic episode to occlude a major vessel by macroscopic embolism composed of malignant cell is not commonly reported, during manipulation of the lung at pulmonary resection.

In this paper, an illustrative case is presented with discussion concerning an approach to avoid such a ominous event.

富田 正雄, 綾部 公懿, 川原 克信, 吉田隆一郎, 長谷川 宏, 橋本 哲, 伊藤 重彦,
田川 泰, 草野 裕幸, 川口 昭男, 佐藤 行夫, 添田 修

CASE REPORT

A 70-year-old man was admitted to our clinic in May 1986, complained of hemotysis with an increase in his cough. A large mass was pointed out in the right middle lung field on the chest XP film (Fig. 1).

A diagnosis of poorly differentiated squamous carcinoma was made by TBLB. There were no evidence and findings of inoperability in terms of tumor extension and pulmonary function except for having a episode of receiving a drug for depression of psychological disturbance.

At thoracotomy on May 13, 1986, a large tumor arising from S² partly involving S⁶, measuring 6×7cm, was found. Right upper lobectomy and S⁶ segmentectomy were performed with mediastinal node dissection. Hilar lymph node was apparently involved and the tumor invasion was directly contagious to the superior pulmonary vein. Then, to give a good exposure, the pulmonary artery was first divided. The superior pulmonary vein was felt soft without tumor infiltration to the wall and after dividing it, mucinous content was drained out from the lumen of the superior pulmonary vein which was cut away. Right upper lobectomy with S⁶ segmentectomy was completed with mediastinal node dissection.

In the recovery room, the patient was cared with assistant respiration in aid of a respirator. He did not complained of pain of the lower extremities. On the next day of operation, he complained of pain and coldness on the limbs without arterial pulsation on the both femoral arteries. Aortography revealed interruption of blood circulation at the abdominal aorta just below the renal arteries (Fig. 2). Poor perfusion of the lower extremities prompted us to release the occlusion of the abdominal aorta surgically via transperitoneal route.

The bifurcation of the abdominal aorta was severely sclerotic with calcification. There was no pulsation of the common iliac arteries. Then, aortotomy just below a point of branching of the inferior mesenteric artery and the arteriotomy on both the femoral arteries were done to remove the thromboemboli with use of Fogarty catheter. A thromboembolus mass removed was shown in Fig. 3.

For the fear of re-occlusion of the abdominal aorta due to severely sclerotic lesion, the bifurcation of the aorta was replaced with a y graft (16mm×8mm VASUTHEK). After operation, the lower extremities resumed warm and recovered to normal skin color. Strong pulsation also returned to the femoral arteries. Urinary output was satisfactorily

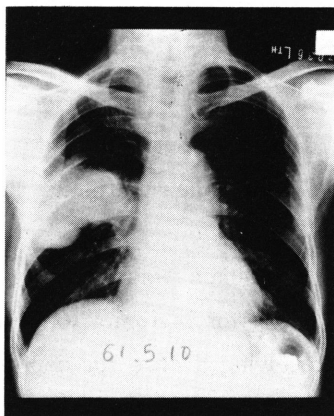


Fig. 1. Chest xp, showing the tumor shadow in the middle lung field on the right.

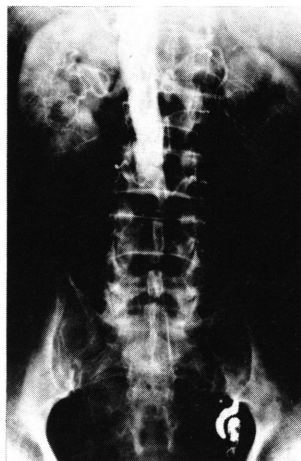


Fig. 2. Aortography, showing interruption of the blood flow to the abdominal aorta below the renal arteries.

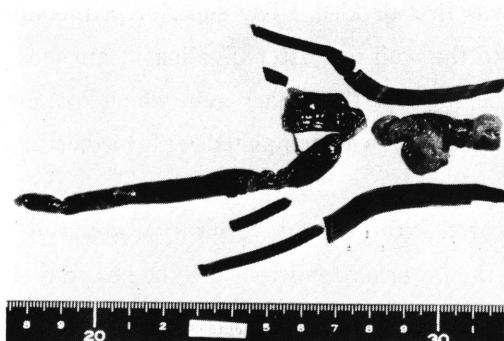


Fig. 3. Thrombus surgically removed by thromboemblectomy.

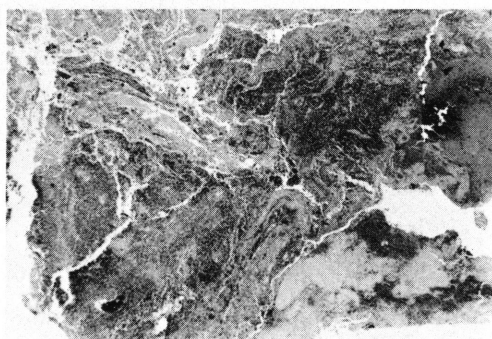


Fig. 4. Histologic finding of the tumor thrombus which was composed of malignant cell.

seen at a rate of 100 to 140ml/h. On the next day of surgery, an episode of anuria of less than 10ml happened. Laboratory data were ominous, 95000ng/ml of myoglobin in the serum and over 500ng/ml of myoglobin in the urine.

The patient's postoperative course was stormy. Cardiac arrest with rapid rise of potassium in the serum could not be successful resuscitated and this had led to death at 35 hours after surgery.

Histologic examination of the thromboembolic mass which was surgically removed revealed a tumor embolus. It was proved that this was composed of poorly undifferentiated squamous cell carcinoma, which was compatible with that of primary lung cancer(Fig. 4).

DISCUSSION

Unexpected tumor embolization to a major vessel can occur during the course of pulmonary resection for the treatment of lung cancer. The common site occurring embolization is the peripheral vessels of the legs, which can easily be detected by ensuing complaints. The complaints based on arterial occlusion are as follows, pain, skin color change and coldness. It, however, is liable to overlook in patients necessitating respiratory support with tracheal intubation immediately after surgery because of paying an attention to respiratory case.

This is prone to occur in the treatment for which original lung cancer is directly involving the wall of the pulmonary vein. GROTH¹⁾ first reported an experience with tumor embolism of the common femoral artery treated with Fogarty catheter. PROBERT²⁾ also described a patient who died suddenly during performing pulmonary resection due to massive tumor embolism of the aortic arch. Such are suggesting that pulmonary resection included the possibility occurring a hazardous complication of tumor embolization.

In this case described herein, aortic saddle embolus accidentally occurred as already reported by BUCKMASTER³⁾ and TABER⁴⁾ *et al.*

TABER⁴⁾ successfully removed a tumor embolus from the aortic bifurcation using the transperitoneal route. We also attempted to remove the saddle embolus transperitoneally using Fogarty catheter in combination with an operative procedure of replacement with artificial vessel graft. In this case, the sclerotic changes of the aortic bifurcation were severe with calcification. This is a major factor contributing to entrapment of tumor embolus at the site of bifurcation of the abdominal aorta. It, furthermore, is emphasized that the time to detect the aortic occlusion after surgery was so delayed that ischemic change of the legs might be advancing enough to cause reperfusion syndrome. Reperfusion syndrome is most attributable to postoperative prognosis for restoration of blood circulation to ischemia. It is frequent in proportion to a duration of existing ischemia. There is no optimum means to avoid occurring reperfusion syndrome even through such had expected to take place in case of a considerably long standing ischemia prior to surgery. If such occurs, we have no proper treatment for myoglobinemia, myopathy, hyperkalemia and metabolic acidosis caused by so-called reperfusion syndrome. The patient's condition has become gradually deteriorated on account of aggravation of ensuing renal and lung failures.

After the beginning of blood recirculation to ischemic limbs, it is no doubt that venous

blood returning from ischemic limbs may halt large amount of myoglobuline and potassium produced by distruction of the muscular component.

These are major factor evolving reperfusion syndrome. Therefore, the venous blood should has been thrown away until these disappeared from a return of venous blood.

It, however, is not known that how long and how much the venous blood draining from ischemia should have been thrown away to prevent occurring reperfusion syndrome and also whether plasmaphoresis is effective or not.

We have no advisal means to prevent and/or deal with this catastrophe after the circulation of the blood had been established by surgical reconstruction.

Little has been said on the subject of prophylactic procedure as to reperfusion syndrome. Greater emphasis has been focused upon early detection and early treatment. It, furthermore, is necessary for approach to prevention from releasing tumor emboli by proceeding ligation of the pulmonary vein at the time of pulmonary resection as reported by TABER.

REFERENCE

- 1) GROTH, KE : Tumor embolism of the common femoral artery treated by embolectomy and heparin. *Surgery* 8 : 617, 1940.
- 2) PROBERT, WR : Sudden operative death due to massive tumor embolism. *Brit. Med. J.* 1 : 435, 1956.
- 3) BUCKMASTER, NS : Simultaneous bilateral tumor embolism of the common iliac arteries : a case report. *Med. J. Aust.*,2 : 516, 1961.
- 4) TABER, RE : Massive systemic tumor embolization during pneumonectomy : a case report with comments on routine primary pulmonary vein ligation. *Ann. Surg.* 154 : 263, 1961.
- 5) HAIMOVICI, H. : Arterial embolism with acute massive ischemic myopathy and myoglobinuria : Evaluation of a hitherto unreported syndrome with report of two cases. *Surgery* 47 : 739-747, 1960.