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Fatal Rupture of a Subclavian Artery Aneurysm after Catheterization for Intraarterial Chemotherapy in a Patient with Malignant Schwannoma

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Abstract Rupture of subclavian artery aneurysms is rare. We report a case of a 67-year-old woman with malignant schwannoma who developed fatal rupture of a subclavian artery aneurysm probably induced by a complication of the long-term indwelled catheter for intraarterial chemotherapy. Its penetration to the lung was demonstrated by CT, MRI, and radiography.

Key Words: Subclavian Artery, Aneurysm, Rupture

Introduction

Aneurysmal formation of the subclavian artery is also rare. It was found in only two of 57 patients with multiple arteriosclerotic peripheral aneurysms during an 11-year period[1]. Thirty eight of 73 patients with brachiocephalic aneurysms during a 40-year period had subclavian artery aneurysms[2]. We reviewed imaging studies of a patient with malignant schwannoma who developed fatal rupture of the subclavian artery aneurysm after catheterization for intraarterial chemotherapy and discuss the clinical significance of this condition.

Case Report

A 67-year-old woman with a 20-year history of polysurgery for recurrent abdominal wall tumors was hospitalized in January 1992. On admission, five subcutaneous recurrent tumors were detected; one of which was 17 cm in diameter at the epigastrium (Fig. 1A), one was 10 cm in diameter at the right iliac region, one was 2 cm in diameter at the left axillary region, and two were 2-3 cm in diameter at bilateral inguinal regions. Biopsy specimen of the tumor at the right iliac region revealed malignant schwannoma. The patient refused additional surgical treatment.

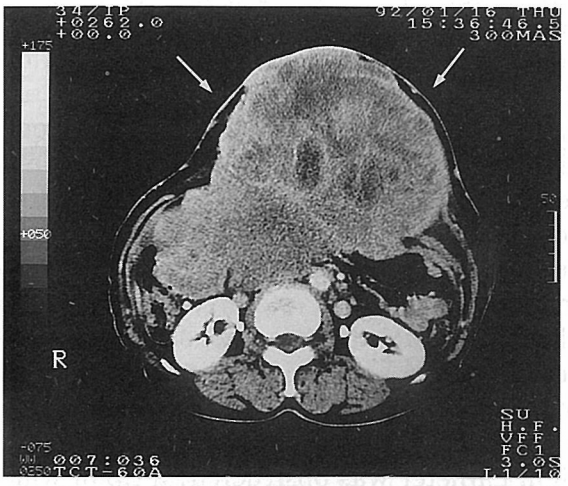

Fig. 1. A,67-year-old woman with malignant schwannoma. Contrast-enhanced CT scan shows the giant subcutaneous tumor (arrow) at the epigastrium.

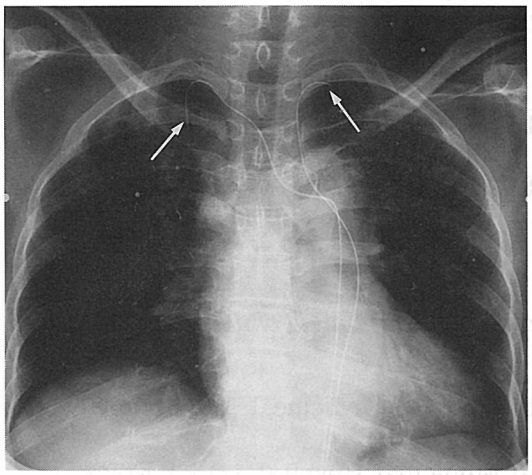

Fig. 1. B, Chest radiography shows two catheters (arrow) indwelled at each internal thoracic artery for intraarterial chemotherapy.

Intraarterial chemotherapy (IAC), radiation therapy and hyperthermia were performed for the giant tumor at the epigastrium. Long-term catheter indwelling was planned for repetitive IACs. Informed consent was obtained. Two 16-gauge catheters were indwelled to each internal thoracic artery (Fig. 1B), branches of the subclavian artery, via the right lateral femoral circumflex artery because selective arteriography showed that some of feeding arteries of the giant tumor were bilateral internal thoracic arteries. Bilateral subclavian arteries were not aneurysmal at that time. Anticancer drugs including cisplatin, cyclophosphamide, and adriacin were infused via two drug infusion ports embedded at the right inguinal region. Two cycles of IAC were performed. Forty days after catheterization, she developed high fever and leucocytosis. Catheter-related sepsis was suspected. Arterial blood culture collected from a port and subcutaneous pus culture adjacent to two ports were positive for methicillin-resistant staphylococcus aureus (MRSA). High fever and subcutaneous abscess subsided after administration of antibiotics. Two months after catheterization, angiography via two ports showed that the right catheter was obstructed, a tip of which seemed to be located in the right internal thoracic artery. However, a tip of the indwelled catheter in the left internal thoracic artery moved to the left subclavian artery. Therefore, additional IAC was not performed but the two catheters remained indwelled until her death. Four months after catheterization, digital artery thrombosis of the right fourth finger developed and subsided by regional infusion of a thrombolytic agent. Six months after catheterization, right Horner's syndrome developed. Chest computed radiography (CR) showed that the trachea had shifted to the left side. Eight months after catheterization, slight hemoptysis developed. A chest CR showed a mass shadow, 8 cm in diameter, at the right lung apex (Fig. 1C). Contrast-enhanced CT scans and T1-weighted magnetic resonance (MR) imaging of the chest revealed a right subclavian artery aneurysm which was located near the base of the right internal thoracic artery and surrounded by hematoma, indicating a pseudoaneurysm (Fig. 1D, E). Hemosputum culture was positive for MRSA. Nine days after the onset of hemoptysis, she developed massive hemoptysis and died. Portable chest CR after tracheal intubation during resuscitation showed the presence of air within the aneurysm (Fig. 1F). Permission for autopsy was not obtained. The direct rupture of the subclavian artery aneurysm into the right lung apex was considered to be responsible for massive hemoptysis and death. Her systolic/diastolic blood pressure level was 140-160 mmHg/90 mmHg during her entire clinical course. She underwent radiation therapy and hyperthermia but these therapies were not effective for tumor control.

Discussion

The reported causes of subclavian artery aneurysms include trauma[3,4,5], infection[6], arteriosclerosis[7], iatrogenic arterial injury [8,9], thoracic outlet syndrome [2], von Recklinghausen's disease [10], and type IV Ehlers-Danlos syndrome [11]. Rupture of subclavian artery aneurysms is rare. Only four of 38 patients with subclavian artery aneurysms ruptured and died during a 40-year period [2].

Our patient did not exhibit any history of trauma, or thoracic outlet syndrome, and no evidence of pleuritis or pneumonia at the right lung apex before the aneurysmal formation

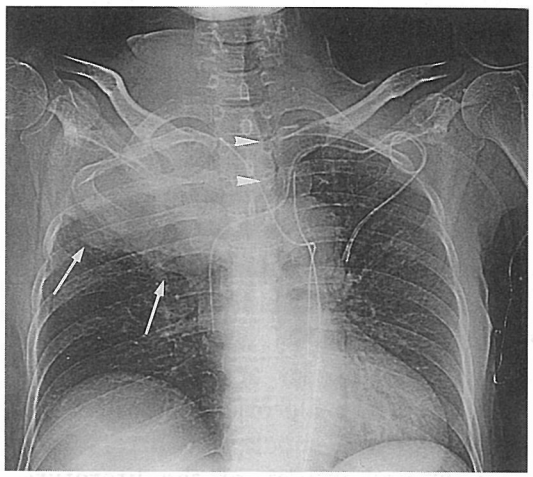

Fig. 1.C, Chest CR shows a mass shadow (arrow) at the right upper lung and the trachea shifted to the left (arrowhead).

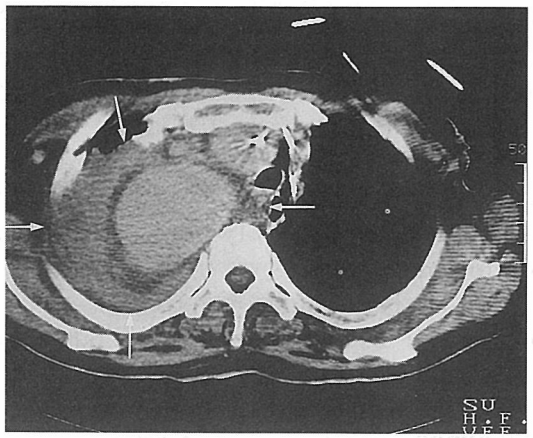

Fig. 1. D, Contrast-enhanced CT scan obtained with mediastinal windows shows the aneurysm surrounded by hematoma, i.e. pseudoaneurysm (arrow).

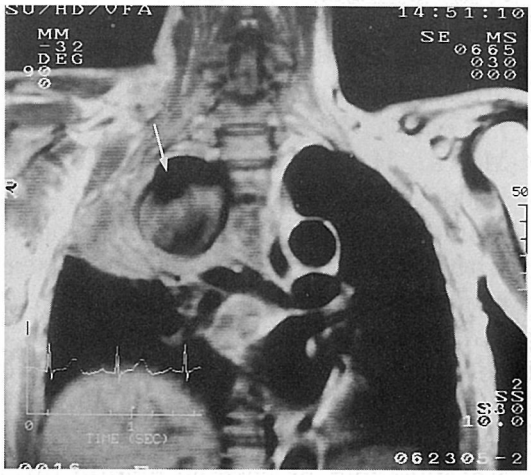

Fig. 1.E, T1-weighted MR imaging shows its flow-void appearance (arrow).

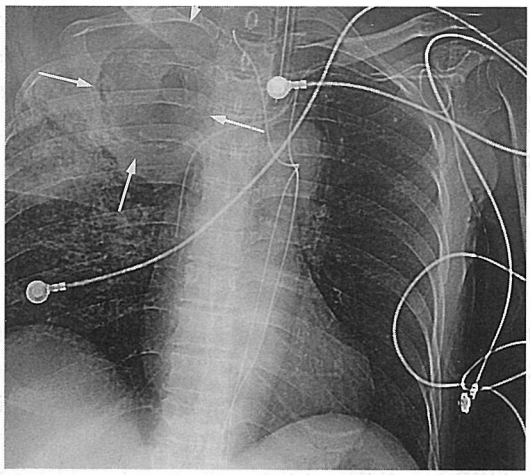

Fig. 1.F, Portable chest CR nine days after C, D, and E shows the presence of air within the aneurysm (arrow).

was detected. Clinical findings such as sepsis and aneurysmal formation which induced thrombosis of the peripheral artery, Horner's syndrome and subsequently ruptured into the lung, may be attributed to catheter-related complications. The major complications were likely caused by the right catheter because the symptoms were restricted to the right side of the patient, except for sepsis. The difference between the two catheters was the indwelling duration of each catheter tip. The right tip remained in the internal thoracic artery longer than the left one. Possible mechanisms are as follows: firstly, vascular injury occurred due to the tip of the right indwelled catheter. Secondly, a mycotic aneurysm presumably developed after infection of MRSA. Regarding the time of aneurysmal formation, the right subclavian artery may have become aneurysmal 4-6 months after catheterization according to these clinical findings such as digital artery thrombosis, Horner's syndrome, and the trachea shift to the left direction. Finally, the aneurysm enlarged, attached to the right lung apex and subsequently penetrated into the lung 8 months after catheterization. Penetration to the lung was likely induced and progressed by MRSA infection. If the infection had not been present, only spontaneous hemothorax may

have occurred after rupture of the aneurysm[10]. Air communication between some drainage bronchi and the aneurysm was depicted by portable chest CR after tracheal intubation.

We reported a case of a ruptured subclavian artery aneurysm probably induced by a complication of the long-term indwelled catheter for IAC. Early recognition and surgical repair would have been necessary for successful treatment.

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