Pulmonary Embolism Due to Internal Jugular Vein Thrombosis without an Indwelling Catheter

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Abstract

A 65-year-old man who had undergone retropubic prostatectomy for prostate adenocarcinoma presented with sudden dyspnea and chest pain. Contrast-enhanced multi-slice computed tomography (MSCT) revealed thrombi in the left internal jugular vein (IJV) and in branches of the right pulmonary artery. Ultrasonography showed that the thrombus which occluded the left IJV was hypoechoic and mobile. After beginning anticoagulant therapy, he again presented with dyspnea and transient hypotension. MSCT and ultrasonography showed that the IJV thrombus had moved and caused a new embolism of the left pulmonary artery branch. This is a rare case of a patient who experienced non-catheter-related thrombosis of the IJV.

Key words: internal jugular vein thrombosis, pulmonary embolism, ultrasonography, multi-slice computed tomography

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Introduction

Deep venous thrombosis (DVT) of the lower limbs is widely recognized as a leading cause of pulmonary embolism (PE) (1-7). However, internal jugular vein (IJV) thrombosis is much less common and is generally caused by an indwelling venous catheter or otological infection (8,9). This is a rare case of PE due to IJV thrombosis without an indwelling venous catheter or otological infection.

Case Report

A 65-year-old man who had undergone retropubic prostatectomy for prostate adenocarcinoma presented with sudden dyspnea and chest pain while resting in bed early in the morning on the 2nd postoperative day. He had a previous history of hypertensive cerebral hemorrhage at the age of 56.

A physical examination showed that he had a blood pressure of 112/70 mmHg, a heart rate of 94/min, and a body temperature of 37.5°C. He was 158 centimeters tall and weighed 54 kilograms. Although there was no swelling of his lower extremities, we could detect swelling on the left side of the neck.

Laboratory tests showed peripheral white blood cells 8,790/mm³, hemoglobin 10.8 g/dL, and platelets 15.1×10⁴/mm³. Serum D-dimer value was increased at 9.02 μg/mL. Serum C-reactive protein was 11.6 mg/dL. Arterial blood gas analysis under 3 L/min oxygen supply showed pH value of 7.39, paO₂ of 108 mmHg, and paCO₂ of 44.8 mmHg.

Contrast-enhanced multi-slice computed tomography (MSCT) revealed thrombi in the left IJV and in branches of the right pulmonary artery (Fig. 1). Ultrasonography showed that the thrombus which occluded the left IJV was hypoechoic and mobile (Fig. 2, A-C). There was no evidence of thrombosis in the lower extremities. Preoperative MSCT which had been performed for the assessment of distant and lymph node metastasis had shown no thrombus in the left IJV, vascular abnormalities, or enlarged cervical lymph nodes. Furthermore, there was no indwelling IJV catheter, or hormone therapy peri- and post-operatively. The operation was performed in a dorsal position for 3 hours and 46 minutes without compression of the neck or cervical flexure which could lead to the alterations in the jugular venous flow.
A blood sample test showed normal protein C, protein S, and antithrombin III concentrations. Lupus anticoagulant and anti-cardiolipin antibody tests were negative.

The urologists warned about the possibility of retroperitoneal hemorrhage by anticoagulant therapy in the early postoperative period. Furthermore, the patient had a previous history of hypertensive cerebral hemorrhage. Therefore, after an initial intravenous bolus of heparin 5,000 units, we began to give him less heparin (16,000 units per day) than that suggested by the Japanese guidelines (8). The next morning, he presented with severe abdominal pain. The amount of bloody drainage from retroperitoneum had increased. After consultation with the urologists, we followed their advice to reduce the amount of heparin. At noon, he again presented with dyspnea and transient hypotension while resting in bed. The activated coagulation time at that time was 210 second. MSCT and ultrasonography showed that the IJV thrombus had moved (Fig. 3) and caused a new embolism of the left pulmonary artery branch (Fig. 4, A and B) immediately after the event. Retroperitoneal hematoma was also visible by the MSCT. His dyspnea improved with moderate anticoagulation and the hematoma was absorbed spontaneously without a repeat surgery. He was discharged on the 20th postoperative day.

**Discussion**

This case of acute post-operative PE was very rare for the origin of upper torso DVT (UTDVT) without a central catheter. Acute DVT, a main cause of acute PE, is a serious and potentially fatal disorder that commonly complicates the course of patients in hospital (2). Risk factors for DVT include age, cancer, coagulation disorder, surgery, immobilization, fractures, puerperium, paralysis, use of oral contraceptives, and the antiphospholipid syndrome (1-7). The present case was a high risk patient because of the intrapelvic malignancy in the post-operative state.

The presently available techniques for the objective diag-
nosis of DVT include contrast-enhanced MSCT, ultrasonography, and biochemical assays. According to the Japanese guidelines (10), it is recommended to perform MSCT of the lower limbs and chest when PE and DVT are suspected. Certainly, most cases of PE result from thrombi that originate in the pelvic region or deep veins of the legs (11). Autopsy study has established that PE arises from a lower limb DVT in 90% of patients (12), and the guidelines also show a similar incidence (10). However, other sources must be considered when there is no evidence of thrombosis in the lower extremities.

Thrombosis of the IJV is commonly related to an indwelling venous catheter or otological infection (8, 9). The incidence of PE due to non-catheter-related thrombosis of the IJV is not fully known. A recent study reported that 87% of UTDVT patients were related to central catheters (9). The IJV was the most common site of the UTDVT (44%). The incidence of the PE was 7.9% in the study. Another large UTDVT study showed that 5% of 546 patients with confirmed UTDVT were found to have a PE (13). In the present case, there was no indwelling IJV catheter, compression of the neck or cervical flexure, hormone therapy, or coagulation disorder. MSCT showed no vascular abnormalities or enlarged cervical lymph nodes that caused alterations in the venous flow. Thrombi form in the valve pockets of calf veins and extend to the proximal veins in cases of DVT of the lower limbs (14). The IJV thrombus in the present case might have formed in the venous valve in a hypercoagulable state due to cancer and perioperative period. The IJV hypoechoic thrombus was considered to be fresh (8), so we thought that it formed peri- and post-operatively. It might have extended from the IJV to the brachiocephalic vein, and then the proximal portion might have become dislodged and moved through the venous system to the pulmonary arteries when the first embolic event occurred.

Previous studies have reported that a placement of a filter in the superior vena cava for upper extremity DVT is effective to prevent PE (15, 16). In the present case, we did not use a superior vena cava filter, because we wanted to avoid another DVT-related to a catheter insertion. Additionally, other studies reported that most patients with an upper extremity DVT would recover without sequelae although a small percentage could have disabling long-term symptoms (9, 17). In the present case, we thought that the size of re-

Figure 3. Contrast-enhanced multi-slice computed tomography and ultrasonography showing that the thrombus in the left internal jugular vein had moved.

Figure 4. Contrast-enhanced multi-slice computed tomography showing a new embolism in the branch of the left pulmonary artery due to the left internal jugular vein thrombus (arrow). A and B, Before and after the new embolism.
sidual IJV thrombus was not sufficient to cause a fatal PE. Aggressive anticoagulation therapy has a risk of bleeding from the post-operative region. Furthermore, the patient had a previous history of hypertensive cerebral hemorrhage. As a result, moderate anticoagulation with intravenous heparin administration was reasonably effective.

This is a rare case of a patient who experienced non-catheter-related thrombosis of the IJV. Since the risk for thrombosis persists over several months post-surgery (1), we will continue the oral anticoagulation therapy and perform follow-up examinations using MSCT and ultrasonography.

References