Deep venous thrombosis (DVT) of the lower extremity is usually diagnosed with ascending contrast venography and ultrasonography. In the present case, we used platelets labelled with In-111 to detect thrombus formation1,2 because a significant correlation between this technique and contrast venography in the detection of DVT has been reported.3

Case Report

A 63-year-old woman complained of chest pain and was referred to hospital where she was found to have left pleural effusion and swelling, local heat and edema of the right lower leg. Initial pulmonary perfusion scintigraphy demonstrated multiple defects and pulmonary thromboembolism (PTE) was confirmed during the anticoagulant and thrombolytic therapy against thrombophlebitis. A Greenfield filter was inserted in the inferior vena cava to prevent recurrence of PTE from the thrombosis that was resistant to therapy. In-111-labeled platelet scintigraphy (platelet scintigraphy) showed abnormal uptake of platelets in the chest, femoral veins and abdomen, which suggested active thrombus formation in those regions, including the filter, and a risk of recurrent PTE. Therefore, the thrombolytic therapy was terminated and the anticoagulant therapy intensified. A computed tomography (CT) scan revealed thrombus at the filter, which was markedly decreased 1 month later on platelet scintigraphy. Pulmonary ventilation and perfusion scintigraphy revealed remarkable improvement of the PTE. In this case, platelet scintigraphy complemented CT in demonstrating the activity and localization of the thrombus and can be used to evaluate the risk of recurrence during thrombolytic therapy after insertion of a filter. (Circ J 2004; 68: 599–601)

Key Words: Deep vein thrombosis; Platelet scintigraphy; Pulmonary thromboembolism; Vena cava filter
of the right lower leg and began anticoagulant therapy using warfarin and thrombolytic therapy using urokinase. As a result, the prothrombin time was approximately 40%, which was well controlled, but she felt a gradual worsening of left leg pain. On the 11th day, chest pain occurred, but the ECG and SaO2 were normal. On the 12th day, pulmonary perfusion scintigraphy was performed after injection of Tc-99m-macroaggregated albumin and this demonstrated multiple wedge-shaped defects in the bilateral peripheral lungs (Fig 1). The venous and pulmonary thrombotic syndromes were considered resistant to the anticoagulant therapy, so on the 20th day, a Greenfield filter (Boston Scientific Corporation, USA) was placed in the inferior vena cava (IVC) via the right internal jugular vein to prevent recurrence of the pulmonary thromboembolism (PTE). An additional Greenfield filter was deployed in the infrarenal IVC.

On the 29th day after admission, platelet scintigraphy was performed after intravenous injection of 18.5 MBq In-111-oxine-labeled autologous platelets to evaluate the active thrombus formation of the whole body, including the site of the filter, during anticoagulant therapy. The scan obtained at 72 h after injection showed an abnormal distribution of tracer in the chest, abdomen and both femoral veins (arrows). (B) One month after treatment, thrombus scintigraphy shows abnormal distribution of tracer from the right external iliac vein to the femoral vein and from the left femoral vein and its collateral veins (arrows). There is no abnormal uptake of tracer in the chest or abdomen.

Fig 2. (A) Platelet scintigraphy (Left: anterior view, Right: posterior view) performed 72 h after intravenous injection of 18.5 MBq In-111-oxine-labeled autologous platelets shows multiple areas of abnormal distribution of tracer in the chest, abdomen and both femoral veins (arrows). (B) One month after treatment, thrombus scintigraphy shows abnormal distribution of tracer from the right external iliac vein to the femoral vein and from the left femoral vein and its collateral veins (arrows). There is no abnormal uptake of tracer in the chest or abdomen.

Fig 3. Pulmonary perfusion (A) and ventilation scintigraphy (B) performed 1 month after treatment show a ventilation perfusion mismatch (arrows). Improvement of distribution is demonstrated in comparison with the previous study (Fig 1).
ous platelet scintigraphy, the abnormal accumulation had markedly decreased and the abnormal distribution of tracer in the chest and abdomen had disappeared. Pulmonary ventilation and perfusion scintigraphy revealed remarkable improvement of the PTE (Fig 3).

Discussion

Pulmonary embolism is a potentially fatal disease that may complicate the course of patients in hospitals, but also affect outpatients and healthy people of advanced age. The diagnosis of DVT of the lower leg is mainly made by ascending contrast venography and ultrasonography, and PTE is confirmed by perfusion scanning, pulmonary angiography or spiral CT. Although D-dimer measurement and ultrasonography are non-invasive and easily performed in patients with suspected pulmonary embolism, they are less sensitive and less specific for thrombosis. In-111-labeled platelet scintigraphy is an alternative to contrast venography for evaluating DVT and a previous report showed a high sensitivity and specificity of this technique for the detection of DVT.

Accumulation of the In-111-platelets is based on the active formation of thrombi, regardless of location in the body, and is therefore useful for determining the appropriate treatment for the active disease site, as well as evaluating the efficacy of anticoagulant therapy, as was shown in the present case. When a patient receives anticoagulant therapy, in particular, heparin, the sensitivity of In-111-platelet scintigraphy is low because the labelled platelets accumulate in active thrombus formation, which is inhibited by heparin. However, the present case demonstrated the thrombus formation during anticoagulant therapy and therefore In-111-platelet scintigraphy can be used to determine the location and degree of formation of fresh thrombi that are resistant to treatment and posing a high risk. Patients with malignant neoplasm who are complicated by thromboembolism are at increased risk for recurrence.

The indication, efficacy and safety of vena caval filters in the prevention of pulmonary embolism in patient with DVT is still controversial. In the present case, platelet scintigraphy revealed the accumulation of platelets at the site of the filter, which suggested the growth of thrombus and a risk of recurrent pulmonary embolism. This is the first report of platelet scintigraphy revealing thrombus formation at the filter, and the appropriate management of the patient. A recent study reported thrombosis at the filter site in 16 of 37 patients who had symptomatic recurrent venous thromboembolism within a 2-year follow-up period. In that study, the initial beneficial effect of the vena caval filter for the prevention of pulmonary embolism was counterbalanced by excessive recurrent DVT, without any difference in mortality. Platelet scintigraphy can be useful for deciding the applicability of thrombolytic therapy in the acute phase and anticoagulant therapy in the chronic phase, based on the evaluation of its efficacy and the risk of recurrence after insertion of a filter.

The 2 principal indication for filter placement is failure of anticoagulant therapy and a major contraindication to anticoagulant therapy. In such cases, the possibility of recurrent thromboembolism is high and platelet scintigraphy can be a useful tool. The present case shows that platelet scintigraphy is complementary to CT for showing the activity and localization of thrombus after the placement of a filter and can assist in the evaluation of the risk of recurrent PTE during thrombolytic therapy.

References