

CASE REPORT

Scintigraphic Detection of an Arterial Thrombus With In-111-Labeled Autologous Platelets

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By scintigraphy with In-111-labeled autologous platelets, we detected an evolving thrombus in the right femoral artery before the patient had developed definite symptoms of vascular occlusion. The thrombus-to-blood activity ratio, measured at 25 hr after injection of tagged platelets, was 57.8.

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Platelets labeled with indium-111 oxine retain in vitro aggregability and survive normally in vivo (1-4). Their distribution can be detected readily by scintigraphy because of the high photon yield of indium-111. We and others have used In-111-labeled autologous platelets to detect venous thrombi and atherosclerotic lesions of the carotid arteries in human subjects (5-7). We report here a patient with arterial thrombosis that was detected by radionuclide imaging with In-111-labeled autologous platelets.

CASE REPORT

A 68-year-old woman with insulin-dependent diabetes mellitus was admitted to the hospital with the complaint of sudden onset of low back pain and anesthesia of her right leg. On physical examination there was cyanosis of the right lower extremity and absence of both femoral pulses. She underwent emergency surgery. A saddle embolus was removed from the aortic bifurcation. Both femoral arteries were explored and additional thrombi were removed with Fogarty catheters. At the conclusion of surgery, good pulses were palpable in both lower extremities. Heparin therapy was begun, 5000 units subcutaneously every 12 hr.

On the third postoperative day, a platelet scintigram was begun in an attempt to demonstrate a source for the saddle embolus. The patient's platelets were labeled by the method of Heaton et al. (4) and reinjected; the dose was 489 μ Ci. Images were obtained with a scintillation camera immediately, and 4, 23, and 46 hr later. A focus of activity was noted in the right groin at 4 hr, and it had increased in intensity at 23 hr (Fig. 1). At the time of the 23-hr images, the right lower extremity was again pulseless and the right foot was cool and cyanotic. Surgery was performed again and a thrombus was removed from the right femoral artery with a Fogarty catheter, 25 hr after injection of labeled platelets. The thrombus and a blood sample obtained concurrently were counted in a NaI (Tl) well scintillation detector. The ratio of activity per gram of thrombus to that of per gram of blood was 57.8.

The day after surgery, the patient was imaged again (46 hr after initial injection of labeled platelets). Focally increased activity was still present in the right groin region, but was less intense than on the 23-hr image. The patient recovered uneventfully from the second operation. No source of emboli was discovered.

DISCUSSION

Platelets are important in the initiation and propagation of arterial thrombosis (8). The findings in our patient indicate that In-111-labeled autologous platelets may accumulate in arterial thrombi and achieve a high thrombus-to-blood activity ratio. Platelets appeared to have contributed to the growth of the right femoral thrombus, as is suggested by the increasing activity with time. The focal activity that remained after surgical thrombectomy may represent residual thrombus, platelets adhering to damaged endothelium following Fogarty catheterization, or both. However, it is apparent from this patient's clinical course that these residual platelets did not subsequently form an occlusive arterial thrombus. The case demonstrates the potential value of In-111-platelet scintigraphy for detection of acute arterial thrombosis.

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REFERENCES

1. THAKUR ML, WELCH MJ, JOIST JH, et al: Indium-111 la-

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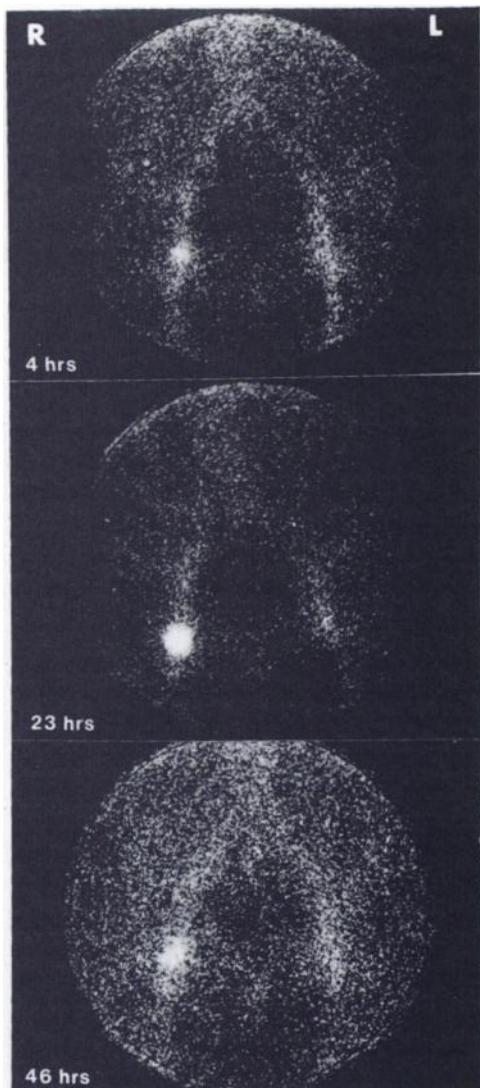


FIG. 1. Anterior images of pelvis obtained 4, 23, and 46 hr after administration of In-111-labeled autologous platelets. Images were obtained with large-field-of-view scintillation camera fitted with medium-energy, parallel-hole collimator. Increased activity is noted in the right iliofemoral region at 4 hr, and at 23 hr focus is more intense. Lesser degree of residual activity seen at 46 hr (21 hr after surgical thrombectomy).

- beled platelets: studies on preparation and evaluation of in vitro and in vivo functions. *Thromb Res* 9: 345-357, 1976
2. SCHEFFEL U, MCINTYRE PA, EVATT B, et al: Evaluation of indium-111 as a new high photon yield gamma-emitting "physiological" platelet label. *Johns Hopkins Med J* 140: 285-293, 1977
 3. JOIST JH, BAKER RK, THAKUR ML, et al: Indium-111-labeled human platelets: uptake and loss of label and in vitro function of labeled platelets. *J Lab Clin Med* 92: 829-836, 1978
 4. HEATON WA, DAVIS HH, WELCH MJ, et al: Indium-111: a new radionuclide label for studying human platelet kinetics. *Br J Haematol* 42: 613-622, 1979
 5. DAVIS HH, HEATON WA, SIEGEL BA, et al: Scintigraphic detection of atherosclerotic lesions and venous thrombi in man by indium-111-labelled autologous platelets. *Lancet* 1: 1185-1187, 1978
 6. GOODWIN DA, BUSHBERG JT, DOHERTY PW, et al: Indium-111-labeled autologous platelets for location of vascular thrombi in humans. *J Nucl Med* 19: 626-634, 1978
 7. DAVIS HH, SIEGEL BA, SHERMAN LA, et al: Scintigraphic detection of carotid atherosclerosis with ^{111}In -labeled autologous platelets. *Circulation*, 1980, in press
 8. MUSTARD JF: Thrombosis and arterial disease. In *Venous and Arterial Thrombosis. Pathogenesis, Diagnosis, Prevention and Therapy*. Joist JH, Sherman LA, eds. New York, Grune & Stratton, 1979, pp 207-223

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