Thallium—201 Myocardial Imaging in Kawasaki Disease

Shunichi KATO, Tohru OHTA, Yutaka SUZUKI* and Seiya MATSUYAMA*

Department of Pediatrics, School of Medicine, Tokai University
*Department of Radiology, School of Medicine, Tokai University
(Received July 16, 1981)

Myocardial imaging using thallium—201 was performed in patients with Kawasaki disease. In two patients whose ECGs showed ischemic changes, the scintiscan demonstrated an area with diminished radioactivity at the site corresponding to electrocardiographic localization of the infarction. Thallium—201 myocardial imaging is useful in the diagnosis of myocardial infarction not only in adults but also in younger children.

(Key Words: Thallium—201 Myocardial Imaging, Myocardial Infarction, Kawasaki Disease)

INTRODUCTION

The usefulness of myocardial imaging with thallium—201 in diagnosing ischemic heart disease has been well established in adults during recent years (2, 12, 13, 15, 18, 20). The common finding is a "cold" area of decreased radioactivity at the site corresponding to electrocardiographic localization of ischemia. There has been no report, to our knowledge, on this noninvasive diagnostic procedure in pediatric patients.

We describe our experiences with thallium—201 myocardial imaging in two infants with Kawasaki disease who could be diagnosed as having myocardial infarction with this imaging. In this report we would like to stress that thallium—201 myocardial imaging is useful in the diagnosis of myocardial ischemia not only in adults but also in younger children.

PATIENTS AND METHODS

Between April, 1975 and March, 1981, there were 56 patients with a diagnosis of Kawasaki disease who were admitted to Tokai University Hospital. Coronary angiography was performed on 45 of these patients and revealed coronary abnormalities such as aneurysms, stenosis, dilatation and irregularity of the wall in 13 patients. Thallium—201 myocardial imaging was indicated before coronary angiography in patients whose ECGs showed ischemic changes or whose coronary risk score, proposed by Asai and Kusakawa (1), was above 10. In two patients the scintiscan showed an area with diminished radioactivity at the site corresponding to electro-
cardiographic localization of infarction.

Fifty $\mu$Ci/kg of thallium—201 as thallium chloride in saline solution was injected intravenously. Images were obtained with an Anger type scintillation camera (Picker Dyna Camera 4) ten to thirty minutes after injection.

Case 1

A nine-month-old Japanese girl was transferred to Tokai University Hospital from another hospital for evaluation of a sudden attack of vomiting, lethargy, tachycardia and tachypnea during the convalescent phase of kawasaki disease. Physical examination on admission revealed an acutely ill, pale infant with a pulse rate of 160 per minute. The weight was 7,650g. The body temperature and blood pressure were normal. Her heart sounds were of good quality and no significant heart murmur was audible. Hematological examinations showed a hemoglobin level of 10.5gm/dl, WBC count of 22,300/cu mm, ESR of 38mm/hr and platelet count of 1.1 million/cu mm. Serum enzyme values were as follows; serum lactic dehydrogenase (LDH) level: 945 IU (normal: 125 to 220), SGOT level:60 IU (normal: 10 to 26), SGPT level: 25 IU (normal: 10 to 26), creatinine phosphokinase (CPK) level: 134 IU (normal: 0 to 130) and alkaline phosphatase level: 170 IU (normal in children: up to 350). On a chest roentgenogram, mild cardiomegaly with a CTR of 60% was noted. ECG showed deep Q waves at I, V5 and V6; QS patterns at aVL, V3 and V4; and ST elevations at I, aVL, V4, V5 and V6. These findings were highly suggestive of recent myocardial infarction, probably a few days prior to admission to our hospital.

Initial treatment consisted of oral anticoagulant and digitalis administration with tapering off of corticosteroid which had been given at another hospital for 10 days.

On the 10th hospital day, thallium—201 myocardial imaging was performed and showed a relatively wide area of diminished radioactivity in the anterolateral wall of the left ventricle (Fig. 1). On the 42nd hospital day, coronary cineangiography and left ventricular angiography were performed under general anesthesia and revealed multiple bilateral giant coronary aneurysms and left ventricular aneurysm with a markedly decreased ejection fraction (Fig. 2).

The patient was discharged on the 105th hospital day. Because of the mild refractory cardiac failure from the ventricular aneurysm she has been medicated with digitalis and aspirin for three years.
Fig. 1  Scintigrams obtained in a patient with Kawasaki disease who was later confirmed not to have coronary abnormalities (left) and a patient with myocardial infarction (case 1, right). Arrows indicate an area with markedly diminished radioactivity at the site of infarction.
Case 2

A previously healthy 2-month-old boy was admitted to Tokai University Hospital with a high fever of four days' duration. He had temperature of 38.5°C, swelling of the cervical and submandibular lymph nodes with tenderness, polymorphous skin eruption on the trunk and the extremities, bilateral conjunctival congestion and dry, red fissured lips. He was normally developed and well-nourished with a body weight of 5.9 kg. Pulse rate was 156 per minute and respiratory rate 30 per minute. Blood pressure was normal. Heart sounds were normal, and no heart murmur was detected. On a chest roentgenogram, the heart was normal in size and shape.

At the time of admission, laboratory values were hemoglobin: 10.3 gm/dl, WBC count: 18,600/cu mm, platelet count: 480,000/cu mm, ESR: 50 mm/hr and CRP: three positives. Cultures from the nasopharynx, throat, urine, spinal fluid and blood were negative for bacteria. Clear watery fluid with 15/cu mm of white blood cells was obtained from a lumbar puncture. In spite of antibiotic therapy the patient remained febrile for 20 days, showing the typical clinical course of Kawasaki disease. On the 15th day of illness, a grade 2, medium pitched, holosystolic regurgitant heart murmur was first noticed at the apex. Hypertension of 166/60 mmHg also developed two days later and required antihypertensives. The chest roentgenogram showed mild cardiomegaly. ECG revealed deep Q waves at V4-5, suggesting acute anterioapical myocardial infarction. Elevation of serum enzymes was also noted at that time; SGOT: 120 IU, LDH: 502 IU and CPK: 155 IU. The patient improved gradually and was discharged after 2 months of hospitalization. The mitral regurgitation murmur lasted for approximately four months and disappeared spontaneously during the follow-up course.

One year after the acute episode, thallium—201 myocardial imaging and left ventricular angiography were performed. The scintiscan showed
a "cold" area at the apex (Fig. 3). The postinfarction apical aneurysm of the left ventricle was demonstrated in left ventricular angiography (Fig. 4). There was irregularity of the left coronary arterial walls but no apparent coronary aneurysm was visualized at that time. Until a follow-up examination at five years of age the patient had not had any restrictions on physical exercise. His physical and mental development has been normal.

Fig. 3 Scintigrams in case 2. Arrows indicate the localization of myocardial infarction.

Fig. 4 Left ventricular angiograms in case 2, frontal (A) and lateral (B) projections. Arrows indicate apical aneurysm of the left ventricle.
DISCUSSION

Thallium–201 myocardial imaging has been introduced as a useful and noninvasive diagnostic procedure in ischemic heart disease in adults. This report demonstrated its usefulness even in the pediatric age group.

Kawasaki disease has drawn much attention in recent years as a new clinical disease entity (4, 5, 6, 8, 9, 21). More than 20,000 cases have been reported in Japan since the original report by Kawasaki (6). Its occurrence has been increasingly reported from Korea (7), Hawaii (10), the continental United States (3, 11), Canada (16), Europe (19) and the Middle East (17). One third to one half of the patients examined by coronary angiography were found to have some abnormalities in the coronary arteries, and approximately 1 to 2% have died of myocardial infarction (4, 21). Since susceptibility of these arteries to atherosclerotic changes in early life can be predicted, careful long term follow-up will be needed. Thallium–201 myocardial scan can be utilized as a noninvasive visualization of the regional myocardial perfusion both in acute stages of the illness and in follow-up periods. Experience in adults suggests that myocardial infarction can be recognized not only in the first few hours of onset but also at any later stage.

REFERENCES