

# <sup>99m</sup>Tc-MAA total body imaging of patent right-to-left shunt with invisible brain activity

## Abstract

Generally, the presence of brain activity in technetium-99m macro aggregated albumin (<sup>99m</sup>Tc-MAA) total-body imaging is considered a hallmark sign of patent right-to-left shunt. Herein, we present a unique case of a patient with Eisenmenger syndrome, whose <sup>99m</sup>Tc-MAA total-body imaging showed increased extrapulmonary activities only in the abdomen, pelvis, and both lower extremities and no activity was observed in the brain and upper extremities. The patient previously underwent a Potts shunt operation, which is a surgical approach to perform a side-to-side anastomosis between the left pulmonary artery and the descending aorta to decompress pulmonary hypertension and right ventricular overload. This case presents a unique pattern of <sup>99m</sup>Tc-MAA total-body imaging for the evaluation of the patency of right-to-left shunt after Potts shunt operation, intentionally made for therapeutic use.

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**Figure 1.** Technetium-99m-MAA total-body imaging of a 30-year-old female, who was diagnosed with Eisenmenger syndrome with persistent atrial fibrillation, revealed increased radiotracer accumulation in the extrapulmonary organs in the abdomen, pelvis, and both lower extremities, except for the brain and upper extremities. An estimated shunt fraction using counts of total body and pulmonary was 19%, suggesting a patent right-to-left shunt (A) [1, 2]. Past medical history revealed that the patient underwent a surgical patch closure of the atrioventricular septal defect at the age of seven. Suffering from progressive pulmonary hypertension and right ventricular failure despite combined medical therapy, she underwent a Potts shunt operation as a palliative bridge intervention to the heart-lung transplantation four years prior [3]. One year ago, a cardiac computed tomography (CT) showed a side-to-side anastomosis between the left pulmonary artery and the descending aorta (B, arrow). Technetium-99m-MAA imaging was requested for the evaluation of the patency of Potts shunt, as a transthoracic Doppler echocardiogram performed one month earlier showed markedly dilated right atrial and ventricular chambers with severe tricuspid regurgitation and severe resting pulmonary hypertension.

The advantage of this novel surgical approach, Potts shunt operation, was to immediately decompress right ventricular afterload without the cyanosis of the upper part of the body [4]. Several previous studies reported the prolonged survival and persistent improvement in functional capacities of palliative Potts shunt in patients with pulmonary hypertension [5-7]. Technetium-99m-MAA total-body imaging using regions of interest over the entire body and the lungs allows for an estimation of the proportion of <sup>99m</sup>Tc-MAA embedded in the capillaries of the systemic circulation, which is proportional to the amount of the right-to-left shunt [8]. Technetium-99m-MAA total-body imaging showed a unique extrapulmonary distribution pattern of radiotracer without visualization of the brain and upper extremities, as the shunt occurred in the descending aorta after branching into the common carotid and subclavian arteries. This case presents the rare but essential indication of <sup>99m</sup>Tc-MAA total-body imaging for the evaluation of the patency of right to left shunt, which was intentionally made for therapeutic use.

*The authors declare that they have no conflicts of interest.*

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