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CLINICAL IMAGING

Lung scintigraphy in the diagnosis and follow-up of pulmonary thromboembolism in children with nephrotic syndrome

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Abstract

Thromboembolic phenomenon and pulmonary embolism is quite frequent in children with nephrotic syndrome (NS). The incidence of pulmonary thromboembolism in children with NS is as common as in adults, and severity is also reported to be relatively high. The mortality rate in NS with thromboembolic complications may be significantly increased if not diagnosed and treated well in time. For establishing the diagnosis of pulmonary embolism, although the combined use of magnetic resonance venography and CT angiography has been proposed, V/Q scan is still the best modality. We performed serial lung perfusion scans in two young patients with NS who developed sudden onset tachypnea during their stay in the hospital. Initial lung perfusion scans showing marked perfusion defects and normal chest X-rays indicated a high probability for pulmonary embolism. The patients were treated with streptokinase, and the study was repeated. Marked improvement was seen in lung perfusion, thereby highlighting the importance of lung perfusion scan in the follow-up of such patients.

Keywords: Nephrotic syndrome; Pulmonary thromboembolism; Streptokinase; Lung scintigraphy

1. Introduction

Hypercoagulable state is a common complication in nephrotic syndrome (NS) due to the loss of various anticoagulants through the kidney [1]. This state predisposes a patient for the development of thromboembolic phenomenon, and pulmonary embolism is seen quiet frequently in such patients [1,2]. Coagulation disturbances in children are not less severe than in adults with NS [3]. Ventilation perfusion (V/Q) lung scan remains, until date, the most sensitive and specific tool for the diagnosis of pulmonary embolism [4]. The V/Q scan is also useful for the follow-up of a patient taken up for heparinisation or streptokinase therapy to illustrate the efficacy of the treatment [5]. We are reporting two such cases of NS treated with streptokinase and followed up with lung perfusion scintigraphy.

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2. Case reports

2.1. Case 1

A 2-year-old young male child with NS was admitted with features of relapse and spontaneous bacterial peritonitis. The diagnosis of NS was established at the age of one and half years, and the patient was put on steroid therapy. The child developed tachypnea during his hospital stay. Clinical examination was unremarkable and X-ray chest was normal. To rule out the possibility of pulmonary thromboembolism (PTE), Tc99m-macroaggregated (Tc99m-MAA) human serum albumin scan was performed (Fig. 1). It showed marked segmental defects suggestive of a high probability for PTE in the setting of normal chest X-ray. Ventilation scan was not feasible in this patient due to severe tachypnea. The patient was thrombolysed with streptokinase, 2000 I.U./kg as bolus followed by 2000 I.U/kg/h for 12 h. Subsequently, he was treated with heparin and, later, with warfarin. Repeat lung perfusion scan

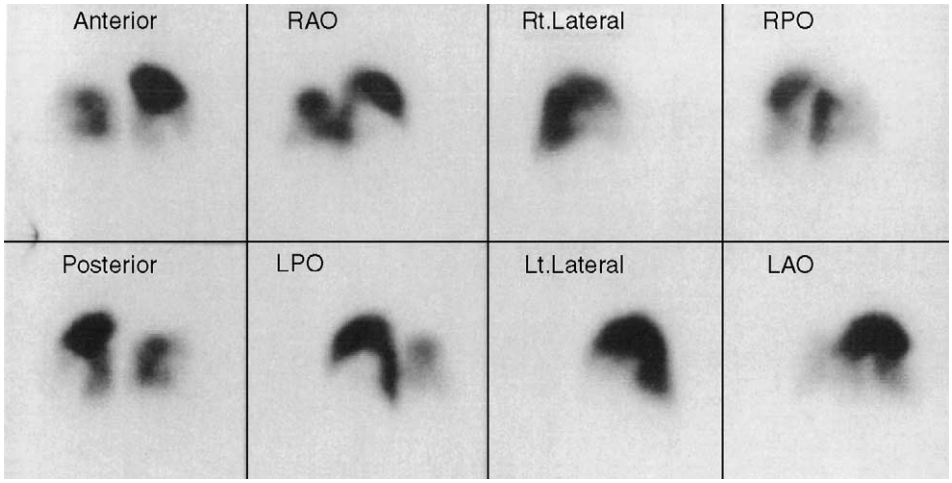

Fig. 1. Lung perfusion scan of Patient 1, performed with Tc-99m microspheres showing many segmental perfusion defects in both the lungs.

showed significant improvement in the perfusion defects compared with the prethrombolytic scan. A follow-up scan showed almost complete resolution (Fig. 2). Presently, the child is doing well and is on steroid therapy for NS.

2.2. Case 2

A four-and-half-year-old female child, diagnosed as a case of NS at the age of 3 years, was first admitted with complaints of relapse and pneumococcal sepsis, meningitis, shock and spontaneous bacterial peritonitis. She was treated with antimicrobials, antihypertensives and steroids. After that, she was admitted four times with symptoms of relapse. On her fourth admission, she had submandibular swelling with cough and abdominal distension. On examination, she was found to be tachypneic. The chest X-ray was normal. To rule out the possibility of PTE, a lung perfusion scan was done (Fig. 3). It showed marked segmental perfusion defects suggestive of high probability for PTE in the setting of normal chest X-ray. The ventilation scan was not performed as the patient was not cooperative. She was subsequently managed with streptokinase, heparin and warfarin. A repeat scan showed marked improvement in the perfusion in the right lung (Fig. 4), although the patient subsequently developed fatal complications of pulmonary hemorrhage, pneumothorax (left) and cardiac arrest.

3. Methods

In both the patients, lung perfusion scan was done after intravenous injection of 74 MBq of Tc99m-MAA MAA in 0.5 ml volume. Multiple static images in the anterior, posterior, RAO, LAO, LPO, RPO, right lateral and left lateral positions were acquired under a large field of view dual head gamma camera (E.Cam, Siemens, Germany), coupled with low-energy general purpose collimator. Each view was of 500000 counts. Two experienced nuclear medicine physicians interpreted the static images for the presence or absence of perfusion defects. The

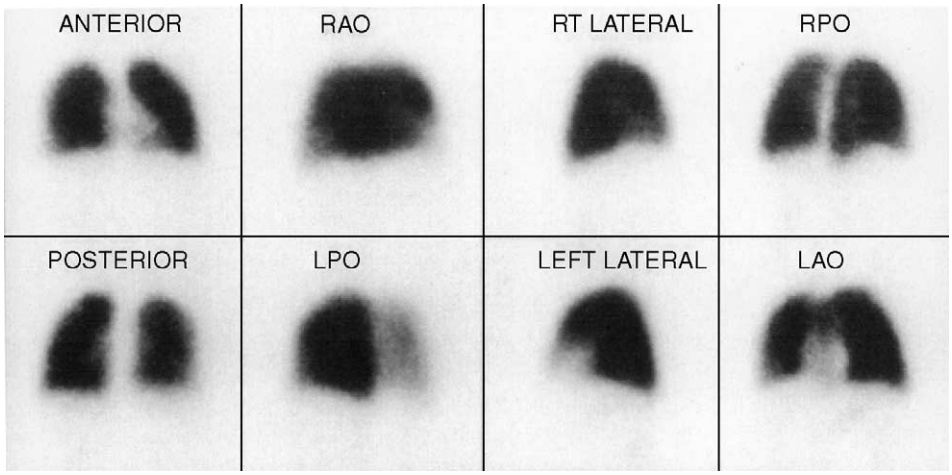

Fig. 2. Follow-up scan performed after streptokinase therapy showing almost complete resolution of the perfusion defects noticed in Fig. 1.