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The "Reversed Halo" Sign in Pulmonary Mucormycosis in a Renal Allograft Recipient

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1. Clinical Image

A 37 years old male patient was a known case of Renal allograft recipient, new-onset diabetes after transplant (NODAT), on triple-drug immunosuppression (Tac/MMF/Steroid), basic disease: Chronic glomerulonephritis and hypertension, induction: ATG 150 mg, donor: brother. He presented with fever, dry cough, and right-sided chest pain for 5 days, 6 months after renal transplant. On investigation, he had leucocytosis, stable graft function, uncontrolled blood sugar. The x-ray showed right midzone consolidation. CT thorax (Figure 1) showed an area of consolidation measuring 5 x 4 cm in the right upper lobe with areas of patchy internal ground glass densities within. An area of consolidation was also noted in the superior segment of the right lower lobe with few areas of breakdown. The CT findings, therefore, revealed an area of consolidation with internal ground-glass haze i.e. "reversed halo "sign suggestive of invasive fungal infection. Immunosuppression was reduced and antifungal (liposomal amphotericin-B) was added with broad-spectrum antibiotics. Bronchoscopy was done and which not show any significant finding. Lobectomy of the right lung was done. Histopathology examination (Figure 2) of lung tissue proved the diagnosis of mucormycosis. The patient improved gradually with the full course of amphotericin-B.

Mucormycosis is a rare opportunistic fungal infection, most often caused by species of the genera Rhizopus, Rhizomucor and Cunninghamella [1]. In renal allograft recipients, it is an extremely rare condition with an incidence of 0.2–1.2% [2, 3]. Factors that predispose renal allograft recipients are anti-rejection induction agents, strong maintenance immunosuppression therapy, and NODAT. The most commonly involved organ is believed to be rhinocerebral followed by the pulmonary and gastrointestinal system. The radiological manifestations of pulmonary mucormycosis include lobar consolidation, mass, cavitation, nodule, and effusion. Recently the "reversed halo" sign has been demonstrated as a fairly specific sign of mucormycosis.

The reversed halo sign is characterized by a central ground-glass opacity surrounded by denser air–space ring-shaped consolidation. It was first described as being specific for cryptogenic organizing pneumonia. Now it has been seen to be associated with a wide array of pulmonary diseases, including invasive pulmonary fungal infections, paracoccidioidomycosis, pneumocystis pneumonia, Wegener's granulomatosis, tuberculosis, pulmonary neoplasms, infarction, and sarcoidosis [4]. In immunocompromised patients, the halo sign (pulmonary nodule surrounded by ground glass) and reversed halo sign are highly suggestive of early infection by an angio-invasive fungus. The halo sign is most commonly associated with invasive pulmonary aspergillosis and reversed halo sign with pulmonary mucormycosis [5].

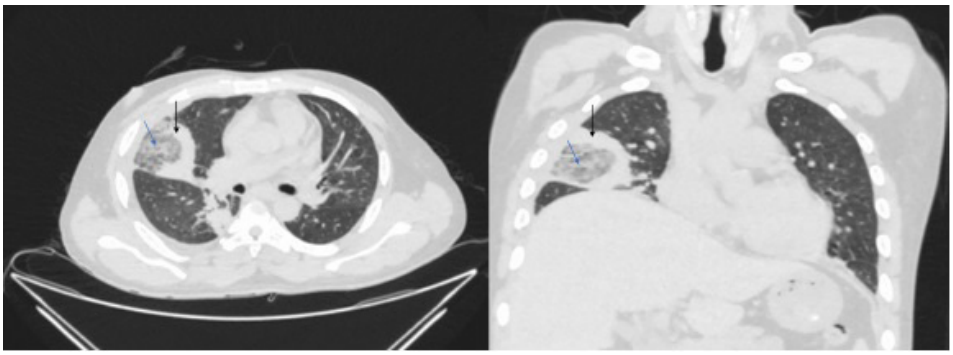

Figure 1: CT thorax showing area of consolidation (black arrows) with areas of internal ground glass densities within (blue arrows) i.e. "reversed halo" sign

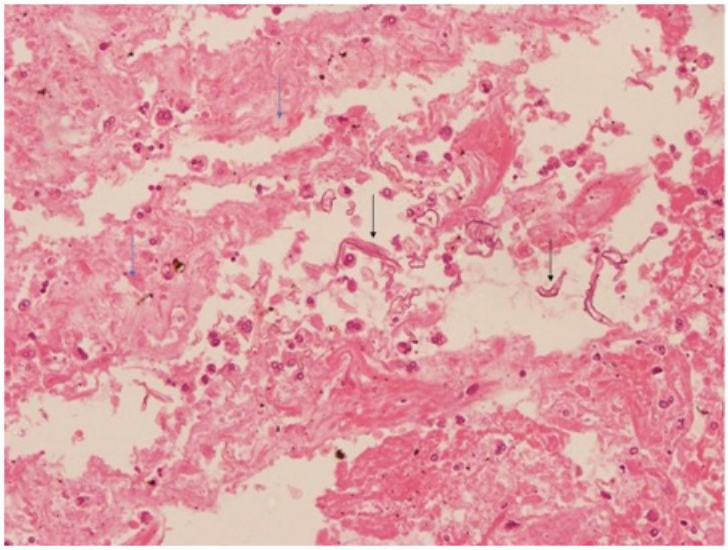

Figure 2: HPE of excised lung tissue showing necrotic lung parenchyma (blue arrows) with broad irregular aseptate fungal hyphae (black arrows)

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