

Reversed halo sign: Uncommon presentation of a common disease

Sir,

A 41-year-old never-smoker female presented with a history of gradually progressive dyspnea, dry cough, and low-grade fever of 4 weeks' duration. The patient was a known case of Sjogren's syndrome and was on treatment with oral hydroxychloroquine. There was no history of hemoptysis, loss of weight, or appetite. There was no significant environmental exposure or occupational history. General physical and respiratory examination was normal. A posteroanterior chest radiograph demonstrated bilateral lower zone alveolar opacities, suggestive of bilateral basal consolidation. High-resolution computed tomography (CT) scan of the thorax [Figure 1] revealed bilateral lower lobe consolidations with some areas, demonstrating central ground-glass opacity, typical of the reversed halo sign. Investigations revealed normal hemogram with a normal absolute eosinophil count ($272/\text{mm}^3$) and normal liver and renal function tests. In view of the classical radiological appearance and coexistent autoimmune disease, organizing pneumonia was considered as the first clinico-radiological possibility.

The reversed halo sign or atoll sign is characterized by a central ground-glass opacity surrounded by a more or less complete ring of denser consolidation. Histopathologically, the central ground-glass indicates alveolar septal inflammation with intact alveolar air spaces. The denser rim is due to inflammation/granulation tissue within the air space itself.^[1] Initially, considered typical for cryptogenic

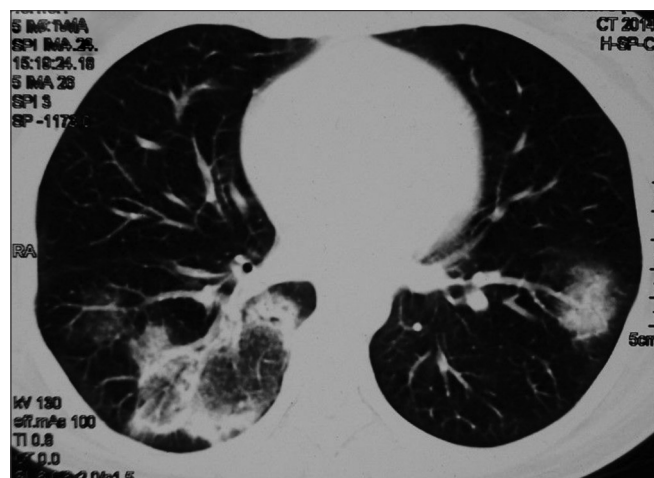


Figure 1: High-resolution computed tomography thorax image (lung window section) showing bilateral lower lobe consolidation with central ground-glass opacity and denser peripheral rim of consolidation suggestive of reversed halo sign

organizing pneumonia (COP), this radiological sign has also been described in other diseases, such as invasive fungal infections, pneumocystis pneumonia, tuberculosis, lipoid pneumonia, granulomatosis with polyangiitis, and sarcoidosis.^[2] In most patients, a histopathological diagnosis may be warranted due to a broad list of differential diagnoses. Options in this patient to obtain a tissue diagnosis would include either a bronchoscopy-centered approach with bronchoalveolar lavage and transbronchial lung biopsy (TBLB) or an image-guided biopsy (CT-guided biopsy). In view of diffuse lower lobe involvement and favorable safety profile with the bronchoscopic approach (lower risk of pneumothorax), TBLB was planned in our patient. The patient underwent flexible bronchoscopy and TBLB from the right lower lobe. Histopathological examination of the lung biopsy showed reticulin-rich nonnecrotizing epithelioid cell granulomas. Serum angiotensin-converting enzyme levels were mildly elevated, and tuberculin skin test demonstrated no induration.

A diagnosis of pulmonary sarcoidosis was established. In view of symptomatic disease, the patient was started on treatment with oral corticosteroids (0.75 mg/kg of prednisolone daily for 4 weeks), gradually tapered over the next 9 months. The patient experienced good symptomatic improvement, repeat chest radiograph at 2 months of treatment showed improvement, and follow-up radiograph following treatment completion was normal [Figure 2]. The patient remains asymptomatic after stopping steroids and is under follow-up for 3 years posttreatment with no relapse.

Reversed halo sign is an atypical CT sign for pulmonary sarcoidosis.^[3,4] The presence of nodular walls or nodules inside the reversed halo indicates granulomatous disease processes such as active pulmonary tuberculosis as well

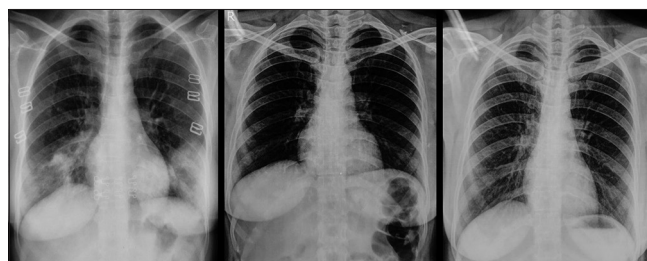


Figure 2: Chest radiograph (pretreatment) showing bilateral basal alveolar opacities (left panel), post-2 months' treatment radiograph (middle panel) showing improvement, and follow-up radiograph (right panel) showing complete clearance of consolidations and a normal radiographic appearance

as sarcoidosis and helps in differentiating from COP. [3,5,6] However, this may not be present in all cases. In an immunocompromised patient, the presence of reversed halo sign on CT should alert a clinician to consider the possibility of invasive fungal infection. In an immunocompetent host like the index patient, it is important to establish a conclusive diagnosis before initiating treatment as this sign is associated with both infectious and noninfectious diseases, for which the treatment approaches may differ.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

***Bijay Pattnaik, PB Sryma, Saurabh Mittal,
Karan Madan***

*Department of Pulmonary, Critical Care and Sleep Medicine,
All India Institute of Medical Sciences, New Delhi, India.
E-mail: drkaranmadan@gmail.com*

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