Galaxy Sign

Andrew Aikins, MD, Jeffrey P. Kanne, MD, and Jonathan H. Chung, MD

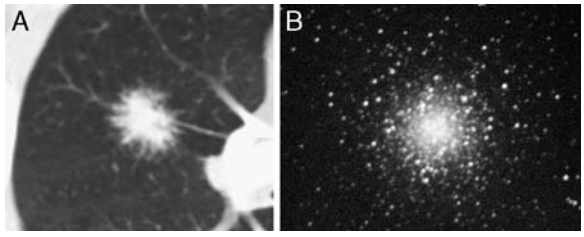

FIGURE 1. A, Contrast enhanced CT shows a bronchovascular nodule in the right upper lobe with peripheral nodular margination consistent with the galaxy sign. B, Telescopic image of the M53 global cluster of stars (courtesy of Mr. Richard Bullock; public domain).

Galaxy Sign

Confluent nodule with multiple small peripheral nodules emanating from the margins of the central nodule

Differential diagnosis

Sarcoidosis
Active Tuberculosis
Malignancy (less likely)
Progressive Massive Fibrosis (less likely)

Appearance: The galaxy sign is an irregularly marginated pulmonary nodule formed by a confluence of multiple smaller nodules (Figs. 1A, B). The concentration of smaller nodules becomes less dense towards the periphery resulting in irregular borders and multiple small satellite nodules, resembling the appearance of a galaxy. It is most often between 1 and 2 cm in diameter but can be larger. Coalescent nodules can have partially smooth borders and internal air bronchograms; a small minority may demonstrate cavitation.[1,2] (All references cited in this article can be found at http://links.lww.com/JTI/A30.)

Explanation: The galaxy sign represents interstitial granulomas that have coalesced and become inseparable simulating the appearance of a larger nodule. The granulomas become less concentrated in the periphery of the lesion, forming satellite nodules that are individually identifiable on histopathology and HRCT.[1]

Discussion: The galaxy sign was initially described in sarcoidosis[1] but is not specific for this condition. The galaxy sign may also be present in active tuberculosis (TB). Findings mimicking the galaxy sign may be present in progressive massive fibrosis (PMF) and neoplasms.[2] The location and number of conglomerated nodules as well as the overall pattern of parenchymal disease and presence of associated findings such as lymphadenopathy must be taken into consideration when formulating a differential diagnosis. With the addition of proper clinical history and demographic information, the galaxy sign can be quite helpful.

A true example of the galaxy sign (a central nodule with surrounding innumerable smaller nodules emanating from the margins of the central nodule) favors a benign etiology. The satellite nodules must be distinguished from spiculation typical of malignancy. The literature describes a potential pitfall when the window and level settings allow for too much contrast and the peripheral nodules appear fused, mimicking the appearance of spiculation.[1] The presence or absence of lymphadenopathy can also be very helpful. Bilateral hilar lymphadenopathy is a hallmark of sarcoidosis and occurs either alone or with mediastinal lymphadenopathy in 95% of patients with sarcoidosis.[2] In the original case series describing the galaxy sign, extensive mediastinal and hilar lymphadenopathy was present in 15 of the 16 (94%) of patients with a positive galaxy sign.[1] In contrast, the incidence of lymphadenopathy in non-small cell lung carcinoma is much lower and extensive mediastinal and bilateral hilar lymphadenopathy is rare in tumors less than 3 cm.[3,4] Calcification within hilar and mediastinal lymphadenopathy is also helpful as it is common in sarcoidosis but rare in untreated malignancy.

Active TB can also present with a conglomerate nodule surrounded by smaller nodules.[5] The location and number of the nodules as well as associated findings are useful in differentiating from sarcoidosis. The galaxy sign in active TB favors the upper lobes and the superior segments of the lower lobes, whereas it does not demonstrate a specific lobar distribution in sarcoidosis.[2] Fifteen of the 16 patients in a sarcoidosis series had multiple foci of the galaxy sign compared to 4 of 8 TB patients; therefore, a single isolated focus of the galaxy sign favors TB. Associated findings can be very helpful as well. Lymphadenopathy is more common in sarcoidosis, while tree-in-bud opacities are characteristic of TB.

PMF in pneumoconiosis can loosely mimic the appearance of a galaxy sign, but distinguishing PMF from the galaxy sign in sarcoidosis is usually not difficult. PMF is characterized by extensive architectural distortion, traction bronchiectasis, paracicatricial emphysema, and nodules mixed with haphazardly arranged bands of fibrosis.[6] In the galaxy sign, fine nodules emanate from a larger central nodule without these extensive fibrotic changes.

Clinical history and demographics can be helpful in troublesome cases. Sarcoidosis can affect patients of any age but it is most commonly diagnosed before the age of 40 years with the peak incidence in the 3rd decade of life.[2] Malignancy is more common in older patients; tuberculosis risk factors or occupational exposure can lead one to more strongly consider active TB or PMF, respectively.

The galaxy sign favors a benign etiology and in the context of appropriate demographics, history, and associated findings can be quite helpful in establishing a specific diagnosis.

The authors declare no conflicts of interest.
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