Splendore-Hoepli phenomenon in bronchocentric granulomatosis

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The formation of eosinophilic radiate structures around fungi, helminth ova, and certain bacteria is most commonly called the Splendore-Hoepli phenomenon. It has been sporadically described since the early twentieth century, mainly in the veterinary fields.¹⁻³ We report a striking example of this rare phenomenon in a human lung in which granulomatous fungal infection was noted. The bronchocentric or bronchiolocentric location of the granulomas in our case indicated bronchocentric granulomatosis, in which the Splendore-Hoepli phenomenon has not previously been described.

Case report

A 50 year old woman presented with a three year history of intermittent cough and wheezing. A chest radiograph was interpreted as showing a mass in the left upper lung field with accompanying atelectasis. Bronchoscopic examination showed considerable narrowing of the ostia of bronchi adjacent to the mass, but their mucosal surfaces remained intact. The results of repeated studies of sputum were negative for malignant cells, acid fast bacilli, and fungi.

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Because malignancy was not fully excluded, a left upper lobectomy and partial resection of the lower lobe was performed three months later.

The resected lung had a wedge shaped, hard area measuring up to 11 cm across. On being sectioned, the lesion consisted of hard, fibrous, pale yellow granular tissue in which abscesses were scattered. The bronchi within the lesion showed substantial stenosis due to proliferation of fibrous tissue in their walls.

Histologically, the affected portion of the lung contained granulomatous foci ranging from less than 1 mm to 1 cm in diameter. The larger ones were purulent and partly lined by residual bronchial mucosa; serial sections showed that some were continuous with bronchial lumina. Although many granulomas were located near pulmonary arteries, these vessels showed no primary inflammatory changes.

Most remarkable was the presence of eosinophilic refractile structures 50-200 µm in diameter, scattered in the granulomas and associated with foreign body giant cells. Each of these structures was composed of club like rods arranged in a radiate and palisading manner (fig 1, left). They stained intensely with orange G and toluidin blue, and mildly to moderately with periodic acid-Schiff (PAS), Gram, phosphotungstic acid haematoxylin, Giemsa, and cresyl violet. They were negative for amyloid, calcium, and mucin, and were not birefringent. Under the fluorescence microscope they showed strong autofluorescence (fig 2). Use of Grocott's stain revealed fragmented fungal hyphae of varying widths surrounded by the eosinophilic structures described above (fig 1, right). Because the hyphae showed occasional septation and dichotomous branching they were considered to be *Aspergillus*. They were only faintly stained with PAS and Gram stains.

The patient was well 51 months after surgery. Post-operative antifungal agents were not required.

Fig 1 Splendore-Hoepli phenomenon in adjacent sections stained by haematoxylin and eosin (left) and Grocott's stains (right). Degenerated hyphae are completely embedded in the eosinophilic radiating clubs. There is a prominent giant cell reaction.

Fig 2 Strong autofluorescence of the radiating structures in Splendore-Hoeppli phenomenon.

Discussion

Eosinophilic radiate structures formed *in vivo* around fungi or helminths have been variously termed radiate formation,⁴ asteroid bodies,⁵ and rosette like clubs but are most commonly referred to as the Splendore-Hoeppli phenomenon in recent reports and textbooks.¹⁻³ Although this is often encountered in experimental fungal and helminthic disease in laboratory animals, it is relatively rare in man.⁴

Moore⁴ and Lurie⁵ have suggested that these structures may be either aborted forms of organisms, protective materials produced by the organisms, or products resulting from host-organism relationships. The most widely accepted theory proposes that they represent an antigen-antibody complex.^{3,5} A recent histochemical study showed that eosinophilic deposits occurring around schistosome ova contain fibronectin, which is seen in the early and intermediate stages of granuloma formation.⁶ The Splendore-Hoeppli phenomenon is almost invariably observed in granulomatous tissue reaction accompanied by variable degrees of suppuration, as in our case. Such a reaction would imply a special allergic relationship of the host to the organism.

In 1973 Liebow described bronchocentric granulomatosis, a pulmonary disease of unknown aetiology in which necrotising granulomas primarily affect bronchi and bronchioles.⁷ Later, Katzenstein *et al* showed that in about half of the cases

hypersensitivity to inhaled *Aspergillus* played an important part in pathogenesis.⁸ The fungal hyphae observed in Katzenstein's cases were almost invariably degenerated and swollen, and resembled *Mucor* spp except that septa were occasionally identified.

We have found no previous description of the Splendore-Hoeppli phenomenon around fungi in cases of bronchocentric granulomatosis. Although the meaning of this change in bronchocentric granulomatosis remains to be clarified, we suggest a careful histological search for Splendore-Hoeppli phenomenon in cases of pulmonary granulomatosis, because its presence serves as a clue to possible fungal infection. It is important to remember that in bronchocentric granulomatosis degenerating eosinophils may give rise to clumps of eosinophilic debris.^{8,9} This material, however, does not have the radiate structure or strong autofluorescence seen in the Splendore-Hoeppli phenomenon, neither is it arranged around organisms—features that may be difficult to recognise without special stains. In our case Grocott's stain was useful in demonstrating the fungus even though the hyphae were very degenerate and only weakly stained by PAS.

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