

An unusual interstitial lung disease

Dipti Gothi, Jyotsna M. Joshi¹

Department of Pulmonary Medicine, ESI-PGIMS, New Delhi, ¹B.Y.L. Nair Hospital and T.N. Medical College, Mumbai, India

Address for correspondence:

Prof. Jyotsna M Joshi, Head of Department of Pulmonary Medicine, B.Y.L. Nair Hospital and T.N. Medical College, Mumbai 400008, India. E-mail: drjoshijm@gmail.com

Submission: 19-09-11
Accepted: 02-01-12

A 48-year-old nonsmoker man, cotton mill worker, working in the carding department for 27 years, presented with progressively worsening dyspnea on exertion and dry cough for a period of 2 years. He did not give history of work-related exacerbation of symptoms. There were no significant systemic complaints. The baseline and postexercise saturation was 98% and 93%, respectively. Bilateral fine end inspiratory crackles were noted on respiratory system examination. Hematological, biochemical, and sputum examination did not show any significant abnormality. Chest radiograph showed scattered nodular opacities. The high-resolution computed tomography (HRCT) of thorax is shown in Figure 1. The spirometry was suggestive of mild restrictive abnormality with forced vital capacity (FVC) of 3.06 (72% predicted), forced

expiratory volume in one second (FEV1) of 2.57 (74% predicted), and FEV1/FVC 84%. The transbronchial lung biopsy showed focal scarring with heavy deposits of anthracotic pigments; patchy peribronchial, alveolar septal thickening, and smooth muscle proliferation [Figure 2].

Questions

1. What does the HRCT (thorax) show?
2. What are the different types of nodule observed on HRCT thorax? What are the differential diagnoses of various types of nodules on HRCT thorax?
3. What are various types of cotton-induced lung disease? What are the diagnostic criteria for occupational lung disease? What is the most likely diagnosis in this case?

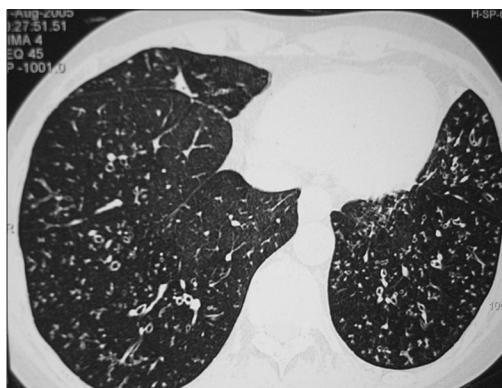


Figure 1: High-resolution computed tomography of thorax (transverse section)

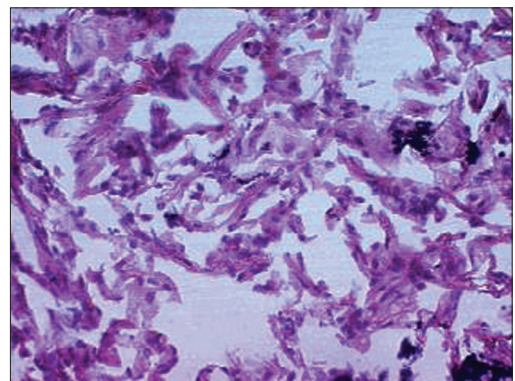


Figure 2: Photomicrograph under high power field (400x) magnification of transbronchial lung biopsy

Access this article online

Quick Response Code:



Website:

www.thoracicmedicine.org

DOI:

10.4103/1817-1737.98851

Answers

1. HRCT of thorax shows multiple, well-defined centrilobular nodules with tree-in-bud appearance.
2. The nodules observed on HRCT of thorax is a very useful tool in diagnosing and characterizing interstitial lung disease and can be divided into three patterns: centrilobular, perilymphatic, and random.^[1] Centrilobular opacities are pathologically regarded as lesions of respiratory bronchiole and are central with respect to the secondary pulmonary lobule [Figure 3a]. They are regularly spaced and do not touch the pleura or fissures, and may have “tree-in-bud” appearance. Perilymphatic nodules are peripheral with respect to the secondary pulmonary lobule [Figure 3b]. These are fissural, subpleural, or along major vessels. They can give an “interface” sign making the adjacent border appear shaggy. Random nodules are fissural but the pattern is random, diffuse, and uniform [Figure 3c]. The differential diagnosis of these nodules is given in Table 1.^[1,2]
3. The various types of cotton-induced lung diseases are byssinosis, chronic obstructive pulmonary disease, cotton fever, and pneumoconiosis.^[3] The diagnostic criteria for occupational lung disease are listed in Table 2.^[4] As described in Table 1, the centrilobular nodules can be observed in infectious bronchiolitis (e.g., tuberculosis), pneumoconiosis, diffuse panbronchiolitis, vasculitis,

Table 1: Differential diagnosis of nodules on HRCT lung scan^[1,2,5]

Centrilobular nodules

- Infectious bronchiolitis including tuberculosis.
- Pneumoconiosis
- Diffuse panbronchiolitis.
- Vasculitis and vascular metastases.
- Respiratory bronchiolitis-interstitial lung disease.
- Hypersensitivity pneumonitis

Perilymphatic

- Sarcoidosis
- Silicosis, coal worker's pneumoconiosis
- Lymphangitic carcinomatosis
- Amyloidosis
- Lymphoid interstitial pneumonia

Random

- Miliary tuberculosis
- Fungal infection
- Metastasis

HRCT = High-resolution computed tomography

vascular metastases, respiratory bronchiolitis, and hypersensitivity pneumonitis.^[5] Exposure to cotton dust, presence of centrilobular nodules, transbronchial lung biopsy suggestive of fiber-induced pneumoconiosis, and presence of diagnostic criteria for occupational lung disease indicate the diagnosis of cotton-induced pneumoconiosis.

Discussion

The variations in presentation from exposure to cotton dust are due to deposition of cotton dust into the different parts of bronchial tree, the duration of exposure, and the exposure to various components of cotton dust-like broken cotton fibers, bracts, pericarps, bacteria, and fungi.^[3] Cotton-induced airways disease is common; however, pulmonary fibrosis and pneumoconiosis due to cotton dust is rarely reported.^[6] Sano first demonstrated fibrosis and granuloma after endotracheal infusion of organic dust in rats.^[7] Later, Ruttner *et al.* showed pulmonary fibrosis in cotton dust-exposed people on postmortem analysis.^[8] Kobayashi *et al.* in 2004 conclusively demonstrated pneumoconiosis caused by cotton dust.^[9] The fibrosis is due to inhalation of cotton dust contaminated with lipopolysaccharide (LPS). LPS causes significant production of nitric oxide (NO) from the alveolar type II epithelial cells and macrophages. NO reacts with superoxide anion to form peroxynitrate, which initiates production of a number of inflammatory cytokines and prostaglandin E₂. These potent inflammatory mediators lead to pulmonary damage and pneumoconiosis.^[10] Cotton dust pneumoconiosis generally present with minimal symptoms, HRCT show centrilobular and peribronchovascular interstitial opacities, and biopsy specimens show peribronchial fibrous thickening due to the presence of organic fibers.^[7,8]

The standard approach to occupational lung diseases involves measures to reduce exposure to the substance even when

Table 2: Diagnostic criteria for occupational lung disease^[4]

The clinical presentation and workup should be consistent with the diagnosis.

A casual relationship between the exposure and the diagnosed condition has been previously established or strongly suggested in the medical, epidemiologic or toxicologic literature.

There should be sufficient exposure to cause the disease.

The details of the particular case, such as the temporal relationship between exposure and disease should be consistent with known information about the exposure-disease association.

There is no other, more likely diagnosis.

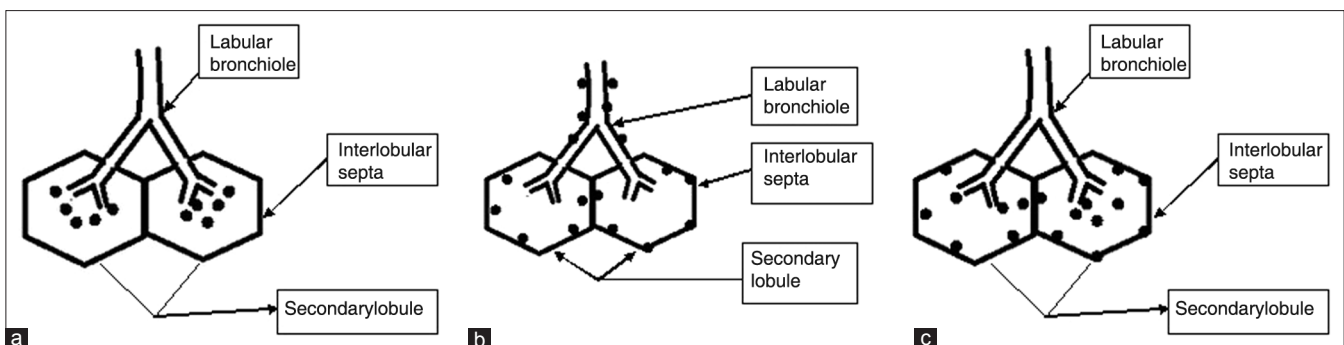


Figure 3: (a) Schematic diagram of centrilobular nodules; (b) Schematic diagram of perilymphatic nodules; (c) Schematic diagram of random nodules

symptoms have not developed. It has been shown that cessation of work from cotton textile is associated with significant improvement in lung function.^[11] Patients can also be counseled to change their occupation if feasible.^[12] Corticosteroids may help in reversal or stabilization of airway and interstitial inflammation.

References

1. Raoof S, Amchentsev A, Vlahos I, Goud A, Naidich DP. Pictorial Essay: Multinodular Disease: A high-resolution CT Scan diagnostic algorithm. *Chest* 2006;129:805-15.
2. Lee KS, Kim TS, Han J, Hwang JH, Yoon JH, Kim Y, *et al.* Diffuse micronodular lung disease: HRCT and pathologic findings. *J Comput Assist Tomogr* 1999;23:99-106.
3. Xing GC. Some opinions on byssinosis in China. *Am J Ind Med* 1987;12:737-42.
4. Redlich CA, Balms JR. Occupational and environmental lung disease In: George RB, Light RW, Matthay MA, Matthay RA, editor. *Chest medicine: Essentials of pulmonary and critical care medicine*, 5th Edition. Philadelphia: Lippincott, Williams and Wilkins; 2005. p. 289-315.
5. Bhat SP, Ladhani SS, Joshi JM. Lung nodules in a silver polisher. *Postgrad Med J* 2002;78:628.
6. Khan AJ, Nanchal R. Cotton dust lung diseases. *Curr Opin Pulm Med* 2007;13:137-41.
7. Sano T. Pathology and pathogenesis of organic dust pneumoconiosis. *J Sci Labour* 1967;43:3-18.
8. Ruttner JR, Spycher MA, Engeler ML. Pulmonary fibrosis induced by cotton fibre inhalation. *Pathol Microbiol (Basel)* 1968;32:1-14.
9. Kobayashi H, Kanoh S, Motoyoshi K, Aida S. Diffuse lung disease caused by cotton fibre inhalation but distinct from byssinosis. *Thorax* 2004;59:1095-7.
10. Castranova V. Role of nitric oxide in the progression of pneumoconiosis. *Biochemistry (Mosc)*. 2004;69:32-7.
11. Shi J, Hang JQ, Mehta AJ, Zhang HX, Dai HL, Su L, *et al.* Long-term effects of work cessation on respiratory health of textile workers: A 25-year follow-up study. *Am J Respir Crit Care Med* 2010;182:200-6.
12. Beckett WS. Occupational respiratory diseases. *N Engl J Med* 2000;342:406-13.

How to cite this article: Gothi D, Joshi JM. An unusual interstitial lung disease. *Ann Thorac Med* 2012;7:162-4.

Source of Support: Nil, **Conflict of Interest:** None declared.

Announcement

Android App



Download
Android
application

FREE

A free application to browse and search the journal's content is now available for Android based mobiles and devices. The application provides "Table of Contents" of the latest issues, which are stored on the device for future offline browsing. Internet connection is required to access the back issues and search facility. The application is compatible with all the versions of Android. The application can be downloaded from <https://market.android.com/details?id=comm.app.medknow>. For suggestions and comments do write back to us.