Hut lung disease in Pakistani rural female population secondary to domestic pollution - Comparison and correlation of HRCT with bronchoscopic findings

Poster No.: C-2717
Congress: ECR 2018
Type: Educational Exhibit
Authors: S. Hamid¹, S. Naushan², N. Ahmed², S. Kadri³, A. G. Haider², N. Hussain², T. Mahmood², ¹Karachi, Sindh/PK, ²Karachi/PK, ³Karachi, karachi/PK
Keywords: Pathology, Occupational / Environmental hazards, Observer performance, CT, Lung
DOI: 10.1594/ecr2018/C-2717

Any information contained in this pdf file is automatically generated from digital material submitted to EPOS by third parties in the form of scientific presentations. References to any names, marks, products, or services of third parties or hypertext links to third-party sites or information are provided solely as a convenience to you and do not in any way constitute or imply ECR’s endorsement, sponsorship or recommendation of the third party, information, product or service. ECR is not responsible for the content of these pages and does not make any representations regarding the content or accuracy of material in this file.

As per copyright regulations, any unauthorised use of the material or parts thereof as well as commercial reproduction or multiple distribution by any traditional or electronically based reproduction/publication method is strictly prohibited.

You agree to defend, indemnify, and hold ECR harmless from and against any and all claims, damages, costs, and expenses, including attorneys' fees, arising from or related to your use of these pages.

Please note: Links to movies, ppt slideshows and any other multimedia files are not available in the pdf version of presentations.

www.myESR.org
Learning objectives

- To know the background and pathophysiology of the Hut lung disease.
- To learn the different clinical presentations of patients with Hut lung disease.
- To recognize different imaging patterns of Hut lung disease on HRCT chest.
- To be able to recognize the different bronchoscopic findings in patients with Hut lung disease.
Background

Biomass is used as a major fuel source by more than 50% of the world’s rural population. It includes materials derived from animal dung, twigs, grass, crop wastes, wood, and charcoal. More than half of the world’s population uses biomass as a major source of energy for cooking and heating. This fuel source is inefficient, requiring fires to be kept going for many hours a day, exposing women and children exposed to years of daily smoke leading to chronic obstructive pulmonary disease.

Patients typically present with symptoms of a pneumoconiosis without history of occupational exposure. The estimated prevalence of hut lung disease is up to 20% in at-risk women. It typically occurs in developing countries. Symptoms ranges from of chronic cough and dyspnea to end-stage interstitial lung disease.

DAPLD is potentially the largest environmentally attributable disorder in the world, with an estimated 3 billion people at risk. It is caused by the inhalation of particles liberated from combustion of biomass fuel. DAPLD results in significant morbidity to the Pakistani rural population particularly the residents of cold areas where there are very lower temperatures and houses are kept close to keep warm.

A detailed environmental history is necessary in such cases for making the diagnosis. In advanced DAPLD, bronchoscopy with transbronchial biopsy and examination of bronchoalveolar lavage fluid help narrow down the differentials.

Radiological imaging provides a non-invasive method to early recognize this condition as removal of the patient from the environment is the only treatment available. The development of well-controlled interventional trials and the commitment of sufficient resources to educate local populaces and develop alternative fuel sources, stove designs, and ventilation are essential toward reducing the magnitude of DAPLD.

In a study from Turkey Kara el al, comparison of HRCT scans of 60 nonsmoking women with at least 10 years of biomass exposure with non-exposed controls showing significantly more of the following abnormalities: reticulation, peribronchovascular thickening, and nodular and ground glass opacities. The asymptomatic subjects with exposure had significantly more ground-glass opacities and less bronchiectasis than those with symptoms. These data suggest that radiographic abnormalities are seen early
in the disease, even in asymptomatic or mildly symptomatic individuals, and persist years after removal from exposure.\textsuperscript{7}
Findings and procedure details

Jinnah Postgraduate Medical Centre is a tertiary care center where we receive a large number of referrals from the pulmonary clinic for evaluation of respiratory symptoms. We wish to share a series of 33 cases of Hut lung disease, in Pakistani rural population with a long-term biomass exposure in poorly ventilated environments. To our knowledge, this is the first reported series from Pakistan describing the HRCT chest findings in such a large number of patients of Hut lung disease.

In our series, majority of the patients were females. All patients had a common history of long-term biomass exposure from indoor combustion of charcoal. None of the patient had history of industrial exposure, mining exposure or pulmonary tuberculosis. Our patients denied any complain of fever, chills, sweats, weight loss, eye pain, arthralgias, rash, or sinusitis. They had no pets at home and no environmental tobacco smoke exposures were reported.

Patients with hut lung can present with a wide spectrum of symptoms, ranging from quite benign to severe productive cough, mild dyspnea, chronic productive cough, pulmonary hypertension and cor pulmonale. Other common findings included cyanosis, crackles, hepatomegaly, and edema. In our series, the most common symptoms were of dyspnea and productive cough.

We performed HRCT Chest on Toshiba Asteion 64 slice CT scanner without intravenous contrast using 1 mm collimation every 1 cm from the apex of the lung to the base. Findings were analyzed on Synapse. Radiological imaging revealed a wide spectrum of findings. Some of the common findings included randomly distributed small intrapulmonary nodules which were present in 85% cases, inter and intralobular septal thinking seen in 73% cases, ground glass haze seen in 66% cases and fibroatelectatic changes leading to para septal emphysema and fibrotic masses oriented parallel to the fissures giving appearances of progressive massive fibrosis seen in 62% cases. Almost 85% patients showed hyperdense calcified mediastinal and hilar lymph nodes. Pleural thickening with non-infective minimal to mild pleural effusions were seen in 15% cases.

All patients underwent bronchoscopy with bronchoalveolar lavage. Samples were sent for AFB, C/S, fungal culture and cytology. Bronchoscopic results showed inflamed and distorted bronchi with typical dark-black anthracotic plaques invading the large and medium sized airways in virtually all patients (100%). Bronchoalveolar lavage showed normal cell differential counts. None of the patients were found to be positive for
tuberculous bacillus. These patients were diagnosed with "hut lung disease". We would like to share some of our cases:

**Case 1:** A 57 years old adult female presented with slowly progressing dyspnea and productive cough for 12 years. HRCT revealed fibroatelactatic changes in bilateral apical regions with marked thickening of the oblique fissure and multiple calcified granulomas. Bronchoscopy showed marked anthracotic plaques. Patient was diagnosed with Hut lung disease. [Fig. 1]

**Fig. 1:** HRCT: Fibroatelactatic changes in bilateral apical region marked thickening of the oblique fissure on left side and multiple calcified granulomas. Bronchoscopy showed anthracotic changes.

**References:** Radiology, Jinnah Postgraduate Medical Center - Karachi/PK
Case 2: A 58 years old elderly female presented with slowly progressing dyspnea and productive cough for 12 years. HRCT demonstrated thickened major fissure in the left lung with traction bronchiectasis and a small interstitial nodule. Bronchoscopy showed marked anthracosis. Patient was diagnosed with Hut lung disease. [Fig. 2]

Fig. 2: HRCT: Thickened major fissure in the left lung with traction bronchiectasis and a small interstitial nodule. Bronchoscopy showed marked anthracosis.

References: Radiology, Jinnah Postgraduate Medical Center - Karachi/PK
Case 3: A 48 years old adult female presented with slowly progressing dyspnea and productive cough for 2 years. Her HRCT showed enlarged calcified mediastinal lymph nodes with fibrotic changes in bilateral perihilar regions. Bronchoscopy was performed which showed marked anthracotic changes. Patient was diagnosed with Hut lung disease. [Fig. 3]

Fig. 3: HRCT: Enlarged calcified mediastinal lymph nodes with fibrotic changes in bilateral perihilar regions. Bronchoscopy show marked anthracotic changes.

References: Radiology, Jinnah Postgraduate Medical Center - Karachi/PK

Case 4: A 56 years old adult female presented with shortness or breath and productive cough for 10 years. HRCT chest revealed multiple enlarged calcified mediastinal lymph nodes with fibroelastatic changes in bilateral perihilar regions, more on left side. Bronchoscopy show marked anthracotic plaques. Patient was diagnosed with Hut lung disease. [Fig. 4]
Fig. 4: HRCT: Multiple enlarged calcified mediastinal lymph nodes. Fibrotic changes in bilateral perihilar regions more on left side. Bronchoscopy show marked anthracotic changes.

References: Radiology, Jinnah Postgraduate Medical Center - Karachi/PK

Case 5: A 62 years old elderly female presented with severe shortness of breath and productive cough for 5 years. HRCT showed fibrotic scar in right lung with calcified mediastinal lymph nodes. Bronchoscopy showed marked anthracotic changes. Patient was diagnosed with Hut lung disease. [Fig. 5]
Fig. 5: HRCT: Fibrotic scar in right lung with calcified mediastinal lymph nodes. Bronchoscopy show marked anthracotic changes.  
References: Radiology, Jinnah Postgraduate Medical Center - Karachi/PK

Case 6: A 55 years old adult female presented with chronic productive cough and dyspnea for 2 years. HRCT revealed basal fibrosis with honey combing, multiple interstitial lung nodules and subsegmental consolidation. Bronchoscopy showed anthracotic plaques. Patient was diagnosed with Hut lung disease. [Fig. 6]
Fig. 6: HRCT: Basal fibrosis with honey combing, interstitial lung nodules and subsegmental consolidation. Bronchoscopy show anthracotic plaques.

References: Radiology, Jinnah Postgraduate Medical Center - Karachi/PK

Case 7: A 49 years old adult female presented with dyspnea, chest tightedness and productive cough for 3 years. HRCT revealed fibrotic scar in the right lower lung with calcified mediastinal lymph nodes. Bronchoscopy showed marked anthracotic changes. Patient was diagnosed with Hut lung disease. [Fig. 7]
Fig. 7: HRCT: Fibrotic scar in right lower lung along the oblique fissure with ground glass haze. Bronchoscopy show anthrasis.

References: Radiology, Jinnah Postgraduate Medical Center - Karachi/PK

Case 8: A 70 years old elderly female presented with dyspnea and chronic productive cough for many years. HRCT revealed patchy ground glass haze with basal fibrodetelactatic changes and calcified hilar and subcarinal lymph nodes. Bronchoscopy showed anthracotis changes. Patient was diagnosed with Hut lung disease. [Fig. 8]
**Fig. 8:** HRCT: Ground glass haze with basal fibrotic changes and calcified hilar and subcarinal lymph nodes. Bronchoscopy show anthracotic changes.

**References:** Radiology, Jinnah Postgraduate Medical Center - Karachi/PK

**Case 9:** A 61 years old elderly female presented with shortness of breath and chronic productive cough for many years. HRCT showed a patch of consolidation in right lower lobe with perihilar infiltrates and fluffy air space shadowing in the posterior segment of right lower lobe. Patient was diagnosed with Hut lung disease with superadded pulmonary infection. Bronchoscopy show anthracotic plaques. [Fig. 9]
Fig. 9: HRCT: Patch of consolidation in right lower lobe with perihilar infiltrates and fluffy air space shadowing in the posterior segment of right lower lobe. Bronchoscopy show anthracotic plaques.

References: Radiology, Jinnah Postgraduate Medical Center - Karachi/PK
**Fig. 1:** HRCT: Fibroatelactatic changes in bilateral apical region marked thickening of the oblique fissure on left side and multiple calcified granulomas. Bronchoscopy showed anthracotic changes.

© Radiology, Jinnah Postgraduate Medical Center - Karachi/PK
**Fig. 2:** HRCT: Thickened major fissure in the left lung with traction bronchiectasis and a small interstitial nodule. Bronchoscopy showed marked anthracosis.

© Radiology, Jinnah Postgraduate Medical Center - Karachi/PK
Fig. 3: HRCT: Enlarged calcified mediastinal lymph nodes with fibrotic changes in bilateral perihilar regions. Bronchoscopy show marked anthracotic changes.

© Radiology, Jinnah Postgraduate Medical Center - Karachi/PK
Fig. 4: HRCT: Multiple enlarged calcified mediastinal lymph nodes. Fibrotic changes in bilateral perihilar regions more on left side. Bronchoscopy show marked anthracotic changes.

© Radiology, Jinnah Postgraduate Medical Center - Karachi/PK
**Fig. 5:** HRCT: Fibrotic scar in right lung with calcified mediastinal lymph nodes. Bronchoscopy show marked anthracotic changes.

© Radiology, Jinnah Postgraduate Medical Center - Karachi/PK
Fig. 6: HRCT: Basal fibrosis with honey combing, interstitial lung nodules and subsegmental consolidation. Bronchoscopy show anthracotic plaques.

© Radiology, Jinnah Postgraduate Medical Center - Karachi/PK
**Fig. 7:** HRCT: Fibrotic scar in right lower lung along the oblique fissure with ground glass haze. Bronchoscopy show anthrasis.

© Radiology, Jinnah Postgraduate Medical Center - Karachi/PK
Fig. 8: HRCT: Ground glass haze with basal fibrotic changes and calcified hilar and subcarinal lymph nodes. Bronchoscopy show anthracotic changes.

© Radiology, Jinnah Postgraduate Medical Center - Karachi/PK
**Fig. 9:** HRCT: Patch of consolidation in right lower lobe with perihilar infiltrates and fluffy air space shadowing in the posterior segment of right lower lobe. Bronchoscopy show anthracotic plaques.

© Radiology, Jinnah Postgraduate Medical Center - Karachi/PK
Conclusion

Hut lung represent the non-infectious, nonmalignant respiratory manifestations of chronic, high level exposures to biomass smoke. The rural population of underdeveloped and developing countries continue to be exposed to high levels of biomass smoke in occupational and domestic environments. More research needs to be done to better characterize disease mechanism, progression, and interventions for prevention and treatment. As residents of lesser developed countries continue to be exposed to high levels of biomass smoke at home or at work and continue to immigrate to developed countries, it is important that health care providers in developed countries be aware of biomass related pulmonary disease and its radiological and histological manifestations.

Early recognition of Hut lung disease by HRCT in patients with long-term biomass exposure is an important diagnostic tool. It enables timely management by removing the patient from the offending environment. In this way progression of the hut lung disease and development of end stage pulmonary fibrosis can be effectively prevented.
Personal information

Dr. Samar Hamid
MBBS
Registrar
Department of Radiology
Jinnah Postgraduate Medical Center, Karachi

Dr. Sadaf Nausheen
FCPS
Consultant Radiologist
Department of Radiology
Jinnah Postgraduate Medical Center, Karachi

Dr. Naveed Ahmed
MBBS, FCPS, FRCR
Consultant Radiologist
Department of Radiology and Cyberknife Robotic Radiosurgery
Jinnah Postgraduate Medical Center, Karachi

Dr. Shazia Kadri
FCPS
Consultant Radiologist
Department of Radiology
Jinnah Postgraduate Medical Center, Karachi

Dr. Anita Ghulam Haider
FCPS
Consultant Radiologist
Department of Radiology
Jinnah Postgraduate Medical Center, Karachi

Dr. Nasir Hussain
Pulmonologist
National Medical Centre, Karachi

Prof. Tariq Mahmood
MBBS, DMRD, FCPS
Head of Radiology, Oncology and Cyberknife Robotic Radiosurgery
References