Pulmonary Manifestations Of Skeletal Disorders

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SPECIAL ACKNOWLEDGEMENT:
Carl Frédéric Duchatellier, MD
I'm coming to get YOU!
DISCLOSURES

NO RELEVANT DISCLOSURES
INTRODUCTION

Lungs are involved in numerous skeletal disorders as:

- An isolated pulmonary manifestation
- An extra-osseous pulmonary feature of the skeletal disorder
- A complication of the underlying skeletal disease
- As a result of the treatment of the skeletal disorder
OBJECTIVE

1) Identification of the various pulmonary manifestations of skeletal disorders.

2) Correlation of clinical and characteristic pulmonary HRCT findings in various skeletal disorders to improve better understanding of these pathologies.

3) Discussion of the relevant differential diagnosis of each of these disorders.
SKELETAL DISORDERS UNDER DISCUSSION

- Rheumatoid Arthritis
- Scleroderma
- Hypertrophic Osteoarthropathy
- Osteopyte Induced Fibrosis
- Langerhans Cell Histiocytosis
- Erdheim- Chester Disease
- Systemic lupus erythematosus
- Ankylosing spondylitis
RHEUMATOID ARTHRITIS

- Following infections, pleuropulmonary involvement is the second most common cause of death in patients with Rheumatoid Arthritis, after infections.

- Significant prognostic value
RHEUMATOID ARTHRITIS

• PLEURA:
  - Effusion, Thickening, Empyema

• PARENCHYMA
  - ILD (commonly UIP)
  - Nodules
  - Caplan’s Syndrome (RA+ Pulmonary nodules+ Coal Miners Pneumoconiosis)

• AIRWAY
  - Bronchiectasis, Cryptogenic organizing pneumonia, Follicular bronchiolitis
UIP type of lung fibrosis and pleural thickening in a patient with Rheumatoid Arthritis
SCLERODERMA

Mediastinum
- Dilated, patulous esophagus
- Rare – Esophageal cancer

Parenchymal involvement
- NSIP type of ILD
- Pulmonary hypertension
- Pnuemonitis

aspiration
infection
NSIP type of basal lung fibrosis and patulous esophagus in a patient of Scleroderma
HYPERTROPHIC OSTEOARTHRATHROPATHY

- Periosteal reaction involving the diaphysis/ meta-diaphysis of long bones of distal extremities
- Clubbing

seen in patients with lung, liver and gastrointestinal disorders
HYPERTROPHIC OSTEOARTHROPATHY

- Bronchogenic Carcinoma
- Pulmonary Lymphoma
- Lung Abscess
- Bronchiectasis
- Pulmonary Metastases (especially osteosarcoma)
- Pleural Fibroma
- Mesothelioma
Right middle lobe mass. X-ray tibia and fibula shows diffuse, smooth periosteal reaction.
OSTEOPHYTE INDUCED FIBROSIS

Thoracic spinal osteophytes causing focal pulmonary opacities

- Atelectasis +/- fibrosis (Focal pulmonary fibrosis)
- Medial basal segment of Rt lower lobe
- Posterior segment of Left lower lobe
Focal lung fibrosis adjacent to osteophytoses in one of the thoracic vertebrae
LANGERHANS CELL HISTIOCYTOSIS

- Multisystem disease
- Pulmonary involvement seen mostly in young adult smokers
  - Nodules (Micronodular/ Reticulonodular opacities)
  - Bizarre shaped cysts
  - Upper zone predominance
  - CP angles spared

DDx ..... Lymphangiendotheliomatosis
Known case of Langerhans Cell Histiocytosis showing upper lobe predominant, bizarre shaped cystic lesions
ERDHEIM- CHESTER DISEASE

• Rare disease
• Infiltration of mononuclear cells in tissues
• Lower limb osteosclerosis
• 50% patients have extra skeletal involvement, 20-30% in lungs

  PULMONARY INVOLVEMENT
  • Smooth Pleural, Fissural and Interseptal thickening
  • Cystic areas
  • Ground glass opacities
Pleuropulmonary involvement is a common feature of the disease, seen in 50-70% patients.

Reduced Diffusion Capacity seen in 88% patients of SLE.

CXR appears normal in almost 40% of these patients.

**PLEURAL INVOLVEMENT**

- Pleuritis
- Effusions
- Residual pleural thickening - 70%
- Must exclude infection as cause

**PARENCHYMAL**

- NSIP type of lung fibrosis
- Lymphocytic Interstitial Pneumonia (rare)
SECONDARY INVOLVEMENT

- Infections (conventional or opportunistic. Commonest pulmonary feature in SLE)
- Atelectasis
  Diaphragmatic myopathy, Embolic disease, Diaphragmatic splinting from painful pleuritis
- Congestive Cardiac F/ RF related pulmonary edema
  Exclude infection + Acute Lupus Pneumonitis
- Drug (procainamide, hydralazine)/ Oxygen toxicity
Lymphocytic interstitial pneumonia (LIP) showing septal thickening and scattered thin walled cysts in a patient of systemic lupus erythematosus
ANKYLOSING SPONDYLITIS

- Upto 15% of the patients have pulmonary involvement.
- Apical Fibrobullous Disease +/- Mycetoma (tuberculous/ fungal)
- Ankylosis of costo-vertebral joints
COMMONEST PULMONARY MANIFESTATIONS
<table>
<thead>
<tr>
<th>Rheumatoid Arthritis</th>
<th>Scleroderma</th>
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</thead>
<tbody>
<tr>
<td>• Pleuritis/Pleural thickening</td>
<td>• Dilated, patulous esophagus</td>
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<tr>
<td>• Pleural Effusion</td>
<td>• UIP type lung fibrosis</td>
</tr>
<tr>
<td>• Interstitial Lung Disease</td>
<td>• Pulmonary arterial hypertension</td>
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<tr>
<td>• Bronchiectasis</td>
<td>• Pneumonitits</td>
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</tbody>
</table>
Hypertrophic osteoarthropathy

Etiologies

- Squamous Cell Carcinoma
- Pulmonary Lymphoma
- Lung Abscess

Osteophyte Induced Fibrosis

- Focal Pulmonary Fibrosis
- Adjacent to thoracic spine osteophytes
<table>
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<tr>
<th>Langerhans Cell Histiocytosis</th>
<th>Systemic Lupus erythematosus</th>
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<tbody>
<tr>
<td>• Mid-/ Upper zone micronodular/reticulonodular opacities / bizarre cysts</td>
<td>• Pleuritis</td>
</tr>
<tr>
<td>• Sparing of costo phrenic angles</td>
<td>• Pleural Effusion</td>
</tr>
<tr>
<td></td>
<td>• Interstitial Fibrosis</td>
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<td>• Infections</td>
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Ankylosing Spondylitis

- Ankylosis of costovertebral joints
- Apical fibroblous disease

Erdheim-Chester Disease

- Smooth pleural, fissural, interlobular septal thickening
- Upper zone predominance
- Periaortic soft tissue infiltration
CONCLUSIONS

• Knowledge of the common thoracic manifestations of skeletal disorders and complications related to treatment is essential for optimum management.

• Overlapping pulmonary features amongst these disorders makes it even more important to be fully aware of these manifestations so the radiologist can collaborate with the clinician and pathologist and play a constructive role in diagnosis and treatment.
References


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SPECIAL ACKNOWLEDGEMENT:
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