Chronic obstructive pulmonary disease

WHO definition

defined as common, preventable & treatable disease characterized by persistent respiratory symptoms and airflow limitation due to airway and/or alveolar abnormalities. Caused by exposure to noxious particles/ gases.

Risk factors

- Strong association with smoking.

Additional Risk factors

- Environmental & Occupational pollutants.
- genetic polymorphism; poor lung development in early life
- airway hyperresponsiveness.

Types of COPD

- Emphysema
- chronic bronchitis.

obstructive diseases

- obstruction to airflow.

→ emphysema
→ Chronic bronchitis
→ asthma
→ bronchiectasis.

EMPHYSEMA

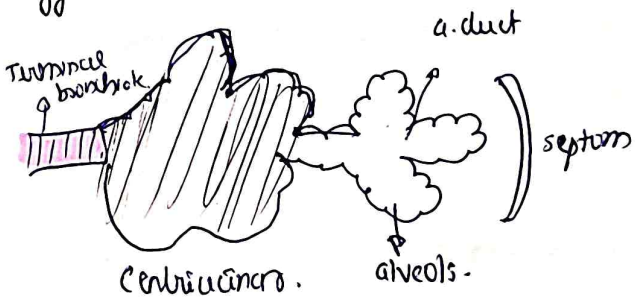
- Irreversible dilatation of airspaces distal to terminal bronchioles accompanied by destruction of their walls with minimal fibrosis

Classification

(1) Centriacinar.
(2) Panacinar
(3) Paraseptal.
(4) Irregular.

Centriacinar.

- central/proximal part of acini formed by respiratory bronchioles are affected.



- more severe and common in upper lobe & apical segment.

Panacinar.

acini uniformly enlarged from respiratory bronchiole to terminal blind alveoli

associated with α-1 antitrypsin deficiency. (pi locus of chromosome 14)

③ **Paraseptal:**

- distal acinus predominantly involved.

site

- adjacent to pleura and at margins of lobule, also adjacent to areas of fibrosis, scarring

Draw.

④ **Irregular:**

- acinus is irregularly involved
- occurs near scar.

Etiology & pathogenesis

Environmental factors.
- Exposure to toxic substance, tobacco smoke, fuels etc.

Genetic predisposition

Congenital α-1 antitrypsin def.

- Oxidative stress → ↑ apoptosis & senescence.
- Inflammatory cells. → Inf. mediators LTB_4, IL8, TNF
- protease – anti protease imbalance.

↓

destruction of alveolar wall.

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Emphysema.

① Toxic injury & inflammation
② Infections.
③ Protease – anti protease imbalance
④ oxidative stress.

(Read from Robbins Tissue notes)

Small airway obstruction in Emphysema is due to:

① loss of elastic tissue in walls of alveoli that surround respiratory bronchioles.

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reduces radial traction.

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respiratory bronchioles collapse during expiration.

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functional airflow obstruction.

② Small airway inflammation may narrow bronchiolar lumen.

Morphology

GROSS

- usually upper 2/3rd of lungs are more severely involved.
- Bullae are found in irregular and distal acinar emphysema.
- advanced Emphysema – enlarged lungs
- large alveoli can be easily seen on all surface of fixed lung.

MICROSCOPY

- abnormally large alveoli are separated by thin septa.
- fibrosis - only focal centriacinar fibrosis present.
- alveolar attachment: loss of attachments of alveoli to outer wall of small airways.
  - pores of Kohn are enlarged
  - advanced disease.
  - → blebs / bullae seen.

other forms of emphysema

1. Compensatory Hyperinflation
2. obstructive overinflation.
3. Bullous emphysema.
4. Interstitial emphysema.

chronic bronchitis

defined as clinically persistent cough with sputum production for atleast 3 m in atleast 2 consecutive years.

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asthma:

→ Curshmann spirals.

→ charcot leyden crystals.

Bronchiectasis

It is a disorder in which destruction of smooth muscle and elastic tissue by inflammation stemming from persistent/severe injections leads to permanent dilation of bronchi and bronchioles

RISK FACTORS or Etiology

- cystic fibrosis
- Kartagener syndromes,
- severe necrosing pneumonia.
- Bronchial obstruction (tumor, foreign body)
- RA, SLE, COPD
- 50% - idiopathic.

Pathogenesis →

Clinical course

- Severe persistent productive cough.
- sputum - foul smell.
  bloody.
- paroxysm of cough in morning (waking up).

Complications

- lung abscess
- pneumonia.
- empyema.
- cor pulmonale.

Obstruction

: partial or total obstruction of bronchial lumen (tumor, foreign body, mucus plug).

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Impairs cleaning mechanism of lung.

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accumulation of secretions distal to obstruction.

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2° infection leads to inflammation.

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weakening and dilatation of airways.

Chronic persistent

• necrotizing infection in bronchi or bronchioles. (Eg: bacteria, virus, fungi)

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↓ bronchial secretion

↓

obstruction of airway by secretions.

↓

Inflammation and fibrosis of airway walls

↓

weakening and dilatation of airways.

Morphology

GROSS

Classification.

According to shape of bronchial dilation.

- Saccular
- cylindrical
- fusiform
- varicose bronchiectasis.

According to extent of involvement

1. Generalized
2. localized.

GROSS

- Bronchioles are dilated and can be traced upto pleural surface.
- CS:
- dilated bronchiole appear saccular, cylindrical etc...
- wall is thick - fibrosis.
- lumen - mucopurulent secretion

MICROSCOPY

Bronchial wall.

- Infiltration of chronic inflammatory cells - lymphocytes & plasma cells in walls of Bronchioles.
- fibrosis of Bronchioles wall.

Mucosal changes

- desquamation of lining epithelium & ulceration.
- metaplasia → pseudostratification