

SUPPURATIVE LUNG DISEASES



Dr. Hazem Samy Matar MD.

At the end of this lecture the student should be able to:

1. Know the different types of suppurative lung diseases.
2. Describe the etiology and pathogenesis of each type.
3. Describe the clinical features of each disease.
4. Interpret the specific investigations.
5. Discuss the different complications.
6. discuss the treatment modalities including surgery.

The term suppurative lung diseases implies the following:

- ◆ **Bronchiectasis**
- ◆ **Lung abscess**
- ◆ **Empyema with BPF**



Bronchiectasis

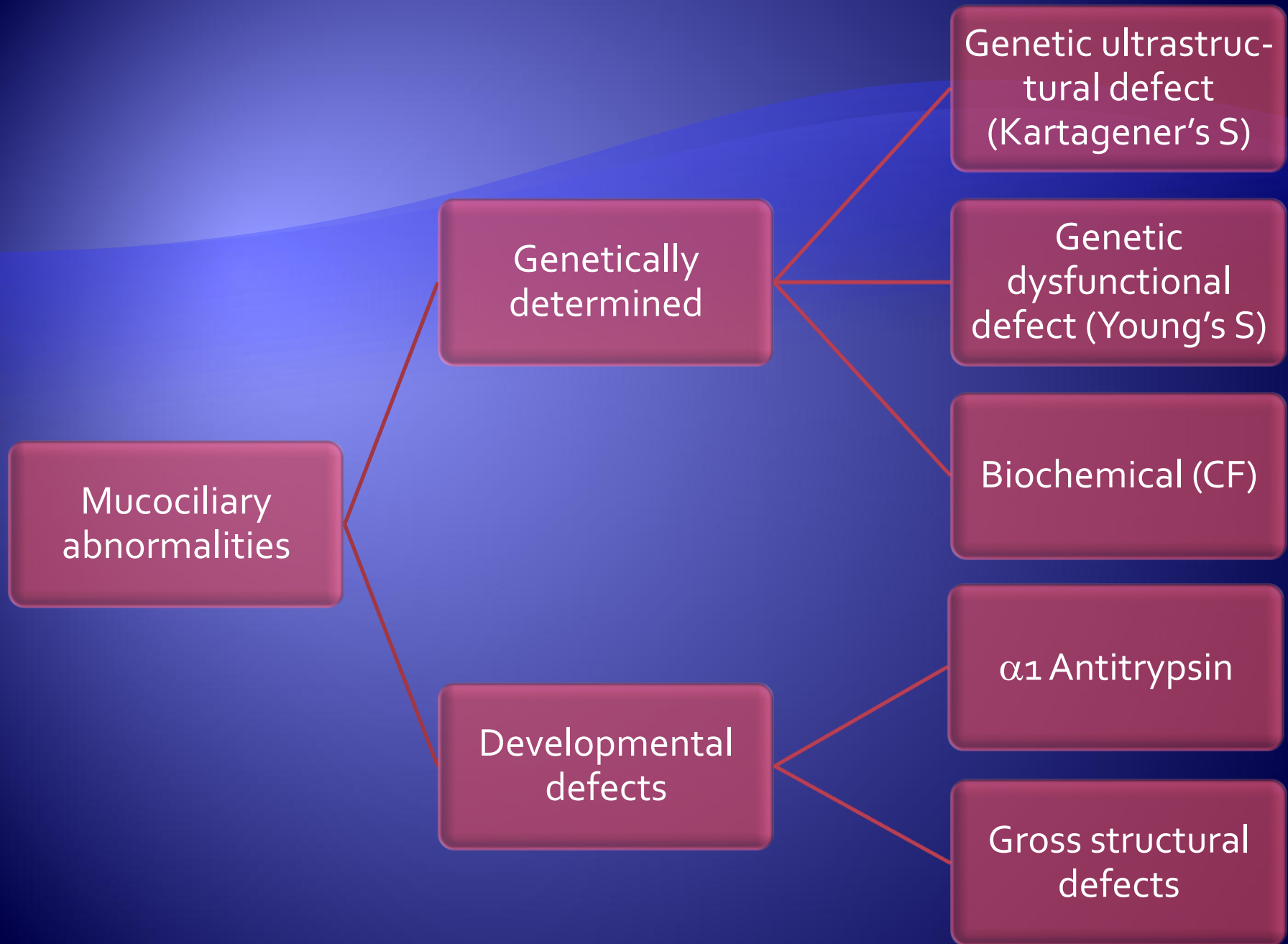
Bronchiectasis

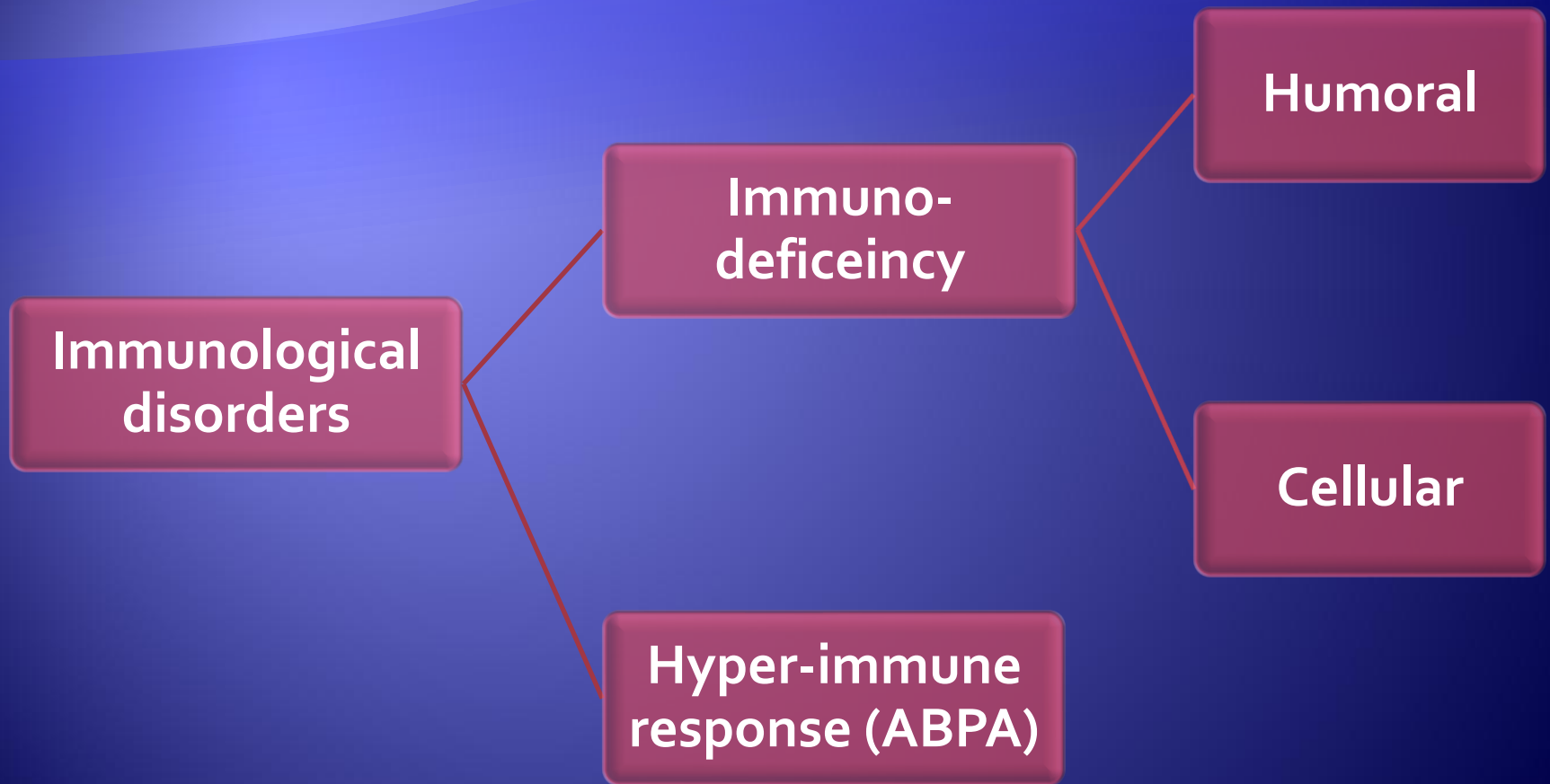
- ◆ Definition:

Abnormal permanent dilatation of one or more bronchi.

- ◆ Etiology:

- I. Mucociliary abnormalities
- II. Immunological disorders
- III. Infection
- IV. Obstruction
- V. Inflammation





Clinical Features:

◆ Symptoms:

1. Cough
2. Haemoptysis
3. Dyspnea
4. Wheezes
5. History of recurrent URTI and sinusitis
6. Infertility
7. Complications
8. Associated autoimmune diseases

◆ Signs:

1. Crepitations.
2. Wheezes.
3. Late signs of collapse, fibrosis, P^{++} or cor pulmonale.
4. General: Cyanosis, clubbing , AI disease or sinusitis and post-nasal discharge.

Diagnosis and investigations:

◆ For the cause:

1. History.
2. Investigations.

◆ Sputum

Common organisms:

- ✓ H.Infleunza.
- ✓ S.Pneumoniae.
- ✓ Pseudomonas.
- ✓ S.Aureus.
- ✓ TB .

◆ Radiology

1. CXR.
2. CT scan.

◆ Laboratory investigations

1. CBC.
2. Sweat chloride test.
3. Saccharine test.
4. Spermatic count and function ,Serum Igs.
5. In asthma: IgE, eosinophilia, +ve skin test, aspergillus +ve precipitin test.

◆ Functional impairment:

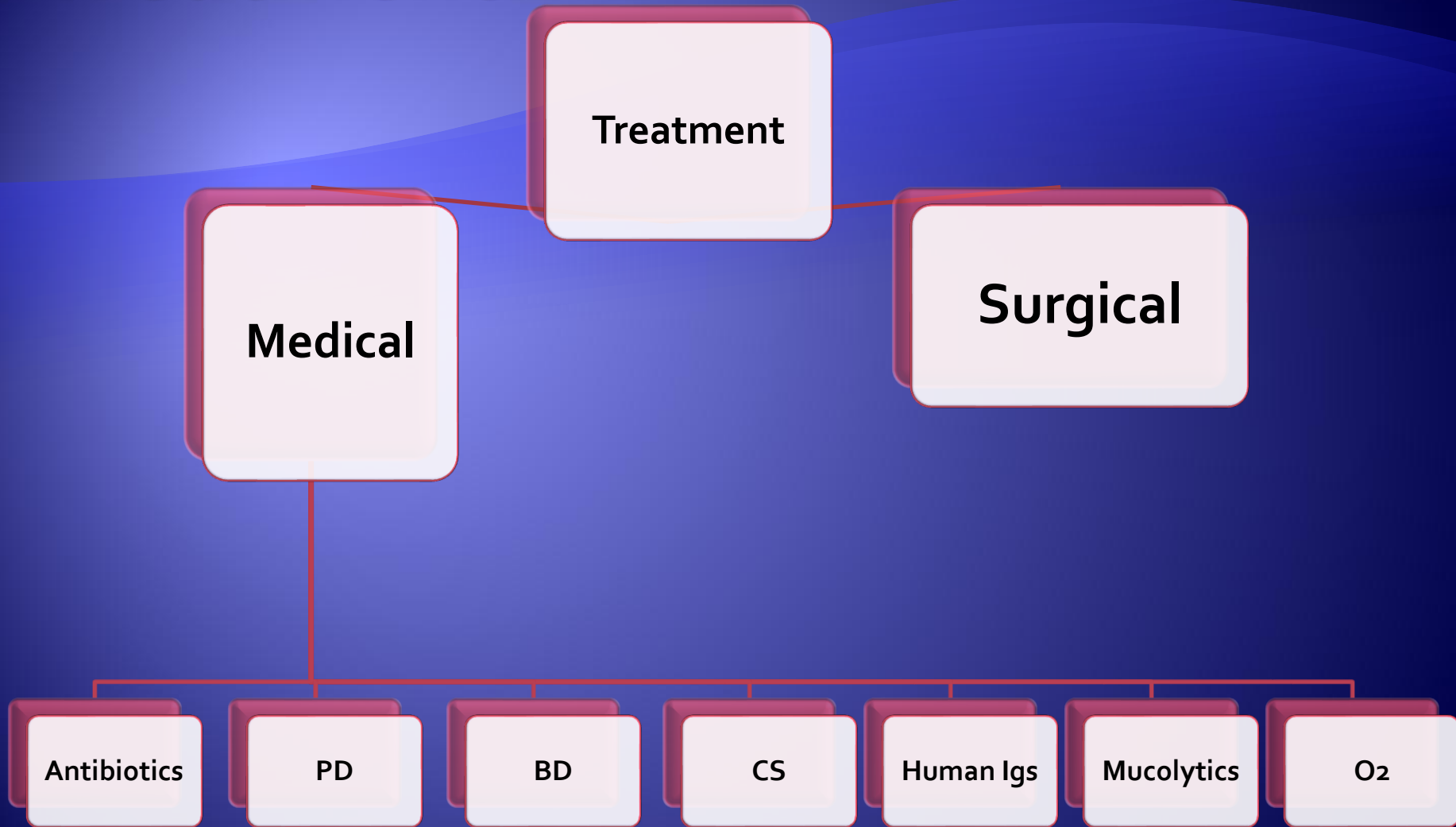
1. Measurement of ventilatory capacity

- ✓ Airway obstruction.
- ✓ Lung volumes and compliance.

2. Gas exchange studies

- ✓ Decreased DLCO.
- ✓ Bronchopulmonary shunt.
- ✓ Abnormal V/P scan.

Treatment:



Antibiotics

◆ Indications:

1. Muroid sputum → muco-purulent sputum.
2. Chronic muco-purulent or purulent sputum → ↑ amount or purulence, change of color, systemic symptoms or worsening of lung functions.

◆ Aim:

1. Subjective improvement of symptoms.
2. Objective improvement of PFT.

♦ Choice of antibiotics:

1. According to culture and sensitivity.
2. According to severity.
3. According to chronicity.
4. According to penetration of Abs.
5. Duration: intermittent or long term.

Steps in using antibiotics

- ◆ Start with penicillin (amoxicillin)
- ◆ If failed response → try augmentin
- ◆ If patient is allergic to penicillin → give clarithromycin or azithromycin
- ◆ Add antibiotics according to C & S
- ◆ Failure of response to penicillin or those with serious condition from the start → IM cefotaxime, anti-staph, or anti-pseudomonas treatment

Postural drainage

◆ Value:

1. Mucociliary clearance
2. Expectoration and mobilization of secretions
3. Improvement of airway obstruction
4. Improvement of V/P mismatch

◆ Aim:

Mobilization of secretions from the lung periphery which is affected by the disease process to the hilum towards the more central unaffected segments in which cough reflex is intact and mucociliary function is preserved aided by gravity.

◆ Technique:

1. Determination of the affected lobe

2. Position

3. Before drainage:

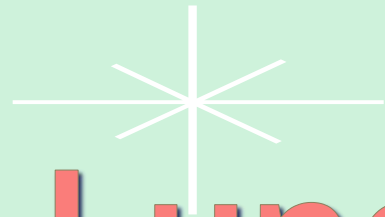
- ◆ Humidification if inspired air $\pm$ BD
- ◆ Deep breathing for 10 minutes
- ◆ Cough when it comes spontaneously

4. PD technique

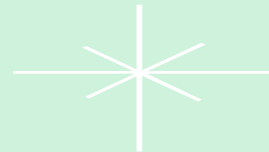
- ◆ Forced expiration without closure of the glottis
- ◆ Ketchup bottle technique
- ◆ Chest wall percussion

Complications

1. Infective exacerbations.
2. Haemoptysis.
3. Core pulmonale and P^{++} .
4. RF.
5. Brain abscess.
6. Amyloidosis.
7. Aspergillosis.
8. Lung cancer.



Lung Abscess



Lung Abscess

◆ Definition

Localized area of destruction of lung parenchyma where pyogenic infection is the cause of tissue necrosis and suppuration.

◆ Predisposing Factors:

1. Aspiration of oro-pharyngeal flora or stomach content.
2. Dental sepsis.
3. Disturbed swallowing.
4. Hematogenous spread (septic emboli).
5. Pre-existing lung disease.
6. Inhalation of aerosolized bacteria.
7. Contaminated respiratory equipments.
8. Complication of pneumonia.
9. Traumatic lung injury.
10. Sub-diaphragmatic spread of infection.
11. Immune deficiency.
12. Disturbed normal mechanical defense.

◆ Complications

1. Haemoptysis.
2. Pleural empyema or pneumothorax.
3. Lung gangrene.
4. Chronic toxemia.
5. Direct or haematogenous spread.

Clinical features

◆ History of:

1. Bronchial obstruction.
2. Oesophageal obstruction.
3. PFs.
4. Aspiration.

◆ Symptoms:

1. Cough.
2. Hemoptysis.
3. Dyspnea.
4. Chest pain.
5. Fever, chills and rigors.

◆ Signs:

1. Consolidation.
2. Pleural affection
 - ✓ Rub
 - ✓ Effusion or empyema
 - ✓ Pyo-pneumothorax
3. Dullness on percussion and ↓intensity of breath sounds
4. Clubbing.

Common organisms

1. Anaerobes
2. Aerobes
3. TB
4. Fungi
5. Blood borne

Anaerobic organisms

```
graph TD; A[Anaerobic organisms] --> B[Bacteroids]; A --> C[Fusobacterium nucleatum]; A --> D[Anaerobic cocci]; B --> E[Fragilis]; B --> F[melaninogenicum];
```

Bacteroids

Fusobacterium
nucleatum

Anaerobic cocci

Fragilis

melaninogenicum

Aerobic organisms

```
graph LR; A[Aerobic organisms] --> B[G +ve]; A --> C[G -ve]; B --> B1[Strept. Melleri]; B --> B2[Strept viridance]; B --> B3[Strept. Pn.]; B --> B4[Strept. Pyogenes]; B --> B5[Staph aureus]; C --> C1[Pseudomonas]; C --> C2[Klebsiella]; C --> C3[E.coli]; C --> C4[Proteus]; C --> C5[H.Infleunza];
```

G +ve

Strept. Melleri

Strept viridance

Strept. Pn.

Strept. Pyogenes

Staph aureus

G -ve

Pseudomonas

Klebsiella

E.coli

Proteus

H.Infleunza

Investigations:

I. Blood picture:

- PMNL $>20.000/\text{mm}^3$
- High ESR
- Mild normocytic normochromic anaemia

II. Microbiological studies:

1. Sputum

- Gram stain
- Culture
- AAFB

2. Blood culture

3. Gas liquid chromatography

4. Specimens for anaerobic culture without oropharyngeal contamination

- TTA
- Percutaneous NA
- PSB

5. For effusion

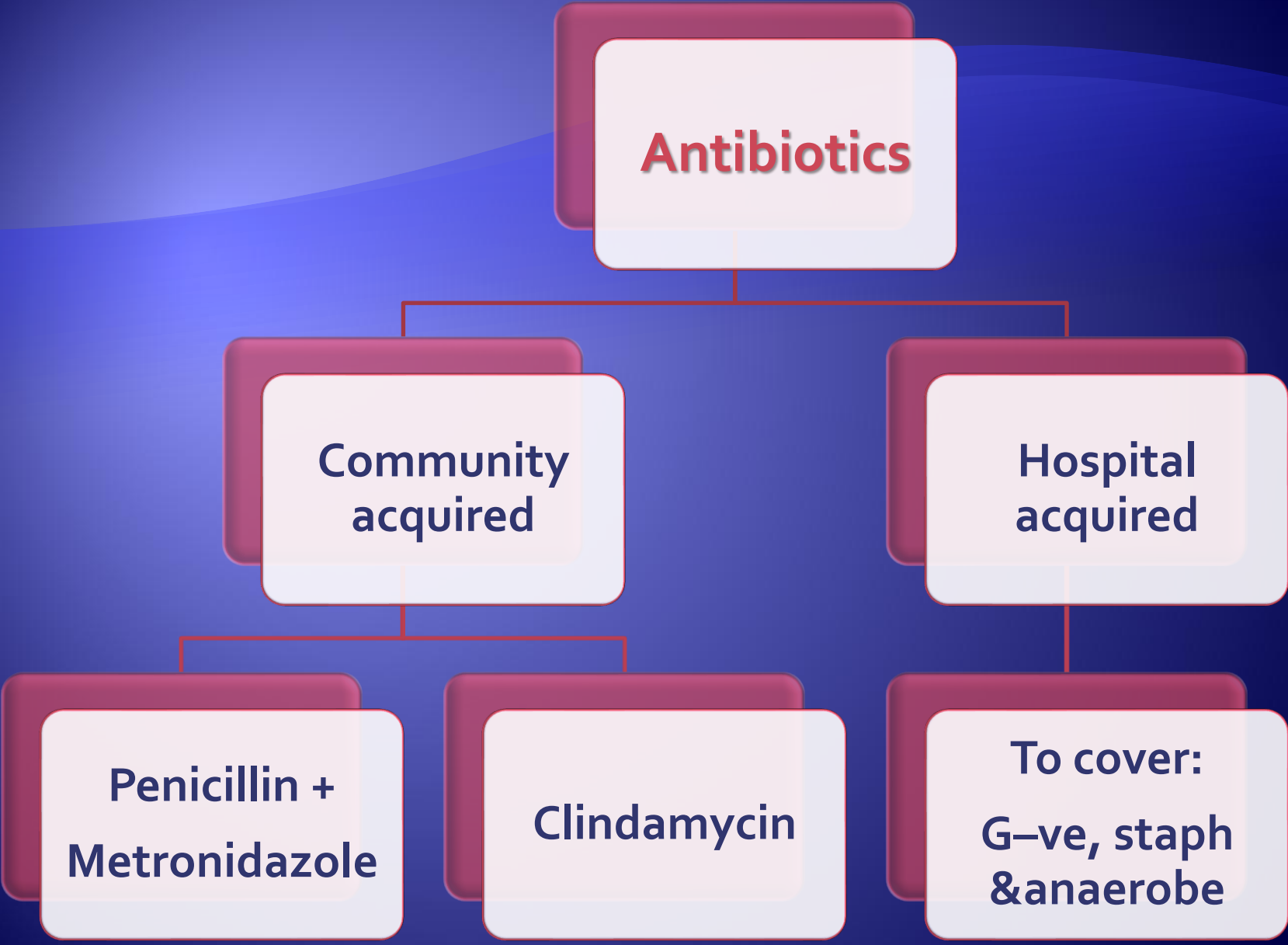
III. Radiology:

1. CXR.
2. CT scan.
3. Esophagus.
4. Bronchoscope.

Treatment

1. Antibiotics
2. Physiotherapy
3. Bronchoscope
4. Surgery

Antibiotics



```
graph TD; A[Antibiotics] --> B[Community acquired]; A --> C[Hospital acquired]; B --> D[Penicillin + Metronidazole]; B --> E[Clindamycin]; C --> F["To cover: G-ve, staph & anaerobe"]
```

The diagram is a hierarchical flowchart. At the top is a box labeled 'Antibiotics'. A line from this box branches into two boxes: 'Community acquired' on the left and 'Hospital acquired' on the right. From 'Community acquired', a line branches into two boxes: 'Penicillin + Metronidazole' and 'Clindamycin'. From 'Hospital acquired', a line leads to a box labeled 'To cover: G-ve, staph & anaerobe'. All boxes are white with rounded corners and a dark red shadow, set against a dark blue background with a lighter blue wavy pattern at the top.

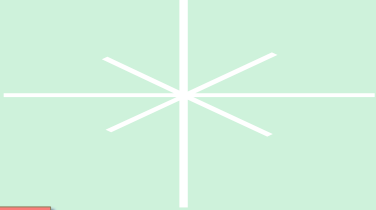
**Community
acquired**

**Penicillin +
Metronidazole**

Clindamycin

**Hospital
acquired**

**To cover:
G-ve, staph
& anaerobe**



Empyema with BPF

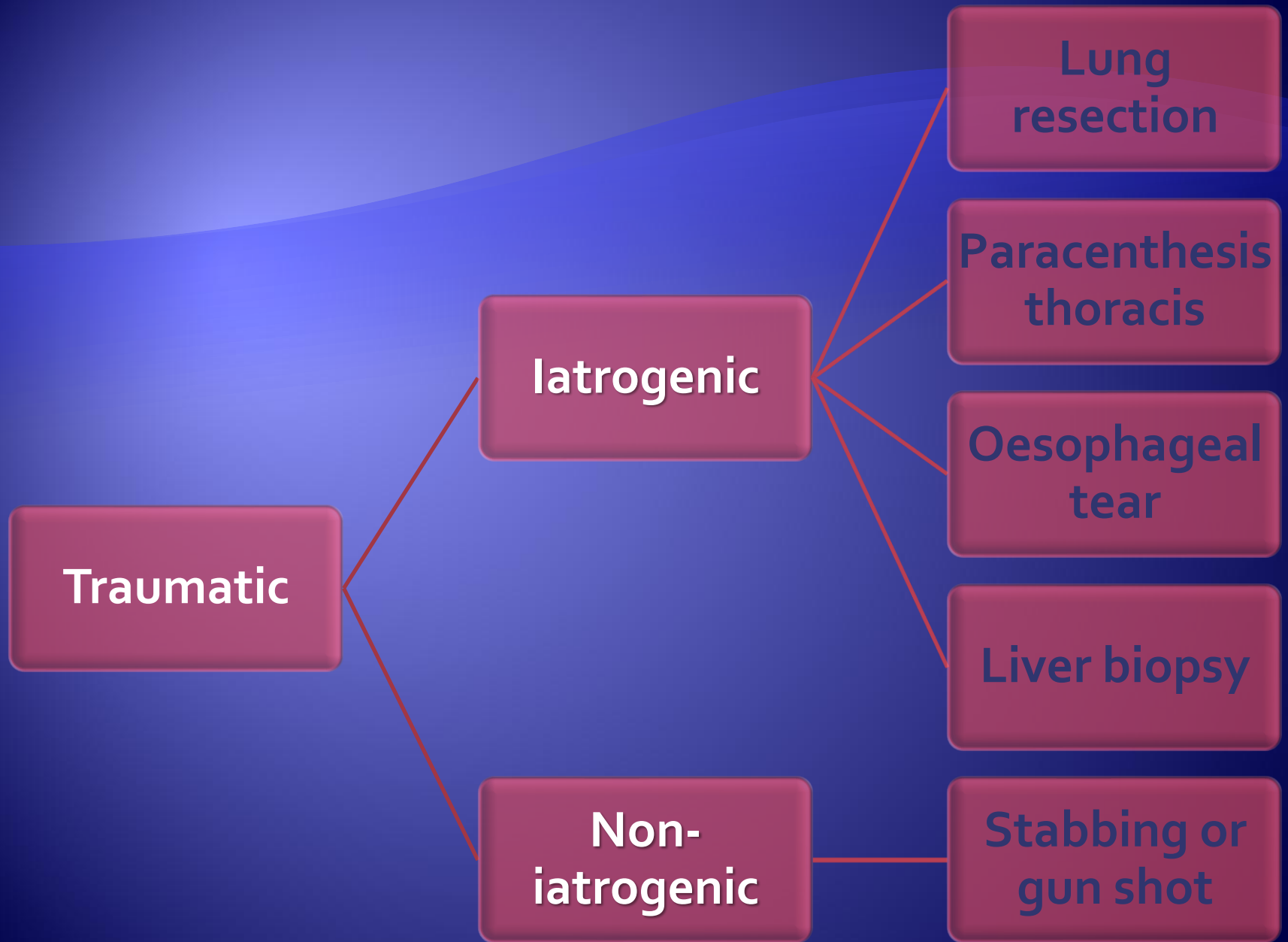
Empyema

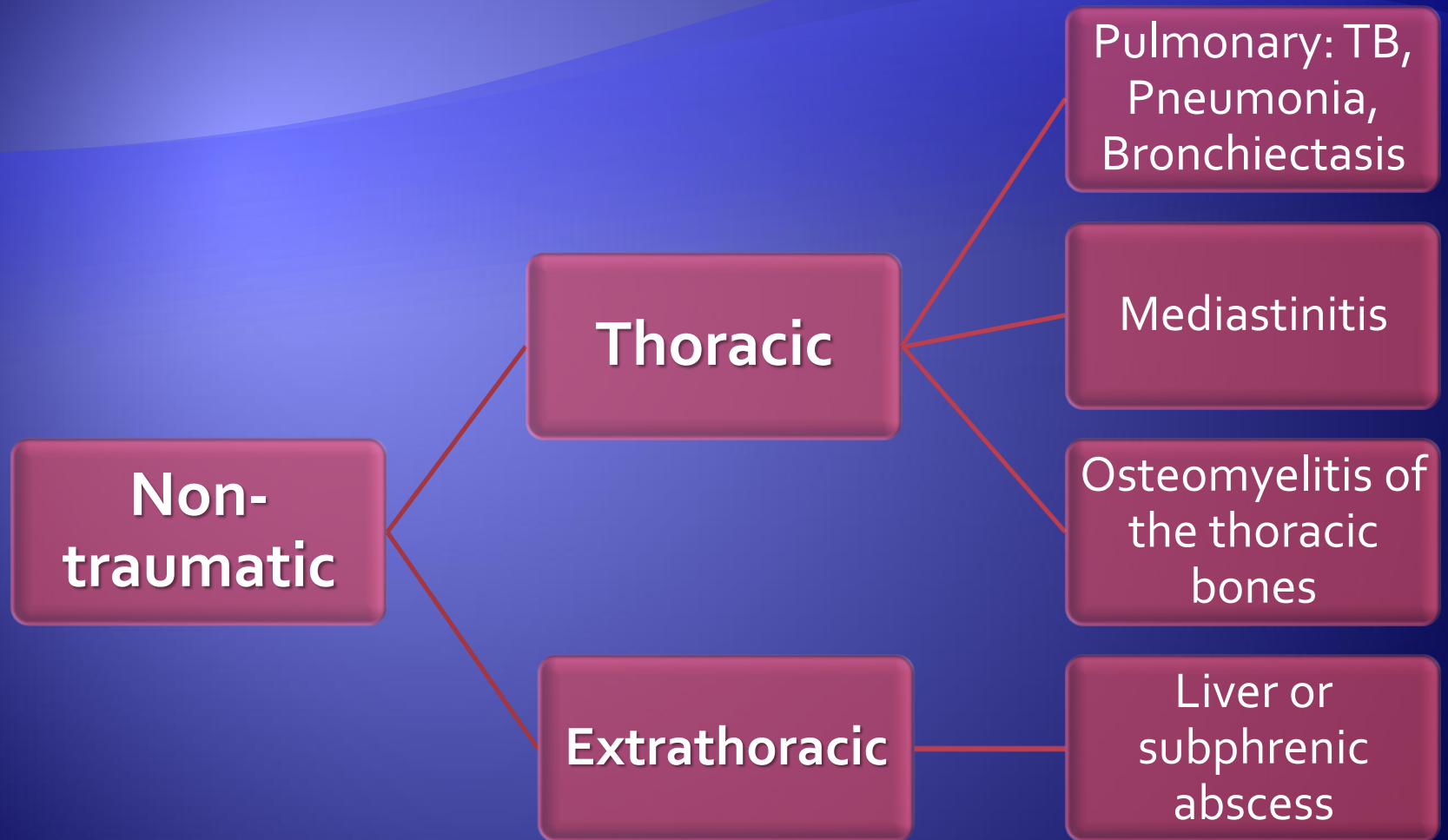
- ◆ Definition:

Pus in the pleural cavity

- ◆ Etiology:

1. Traumatic
2. Non-traumatic





♦ Common organisms:

1. G-ve (30%).
2. Staph (25%).
3. Pneumococcus (15%).
4. Strept. melleri.
5. Anaerobes (11%).
6. TB.
7. Mixed.

Clinical picture:

Symptoms

General: fever, headache, malaise and loss of weight

Local: Pain, dyspnea and cough $\pm$ sputum

Signs

General: weight loss, fever, clubbing, mouth for decaying teeth and groin & lumbar region for tracking pus

Local: pleural effusion or empyema necessitans

Complications

- ◆ Restrictive defect
- ◆ Pleural calcifications
- ◆ BPF
- ◆ Pleuro-cutaneous fistula
- ◆ Pleural thickening

Investigations:

1. Blood and biochemical exam
2. CXR
3. CT scan
4. Radioactive indium III leucocyte scan
5. Sputum culture
6. Blood culture
7. U/S guided thoracocentesis:
 - Chemistry
 - Bacteriology
 - Cytology
8. Thoracoscope

Management

(Abs + Drainage)

Antibiotics:

- ◆ Non-tuberculous : antibiotics should continue 2-3 wks after stoppage of drainage.
- ◆ Tuberculous: anti-tuberculous treatment for 6-9 months according to the response.

Choice of antibiotics

Anaerobes

- ◆ Penicillin+metronidazole
- ◆ β -lactam+ β -lactamase
- ◆ Extended spectrum penicillin
- ◆ Carbapenams
- ◆ Second generation cephalosporins.
- ◆ Clindamycin

Pneumococci

- ◆ Penicillin(high dose) then amoxicillin or PV
- ◆ If allergic: first generation cephalosporins or macrolides

Staph

- ◆ Flucloxacillin
- ◆ Anti-staph penicillin
- ◆ Vancomycin or Teicoplanin

Gram -ve

- ◆ Third generation cephalosporins + aminoglycoside

