Pediatric Bronchoscopy

Protracted Bacterial Bronchitis (PBB)
The Bronchoscopy Findings

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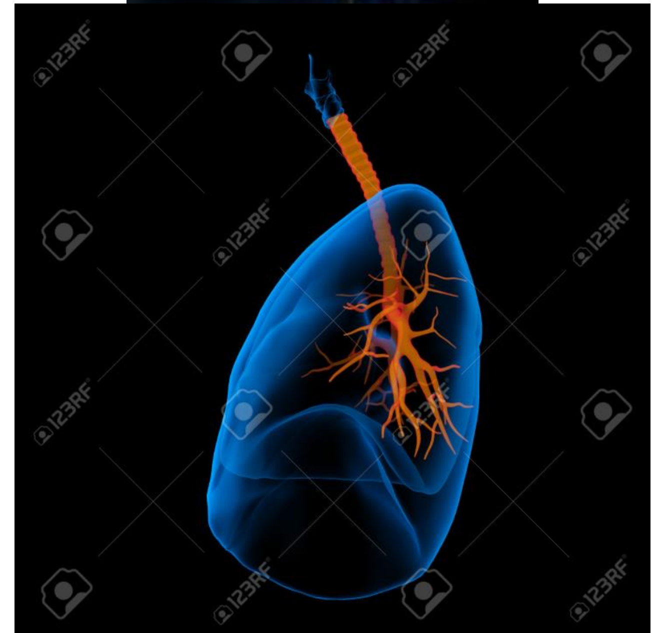
What is PBB?

- PBB (chronic bronchitis in childhood) has been officially recognized by the British Thoracic Society
- PBB is a persistent or protracted bacterial infection of the respiratory airways
- PBB is the common cause of chronic WET cough which lasts longer than four weeks among children worldwide



Protracted Bacterial Bronchitis

The three most commonly identified bacteria:

- ✓ H influenzae, especially non-typable H. influenza strains
- ✓ Streptococcus pneumoniae
- ✓ Moraxella catarrhalis

The occurrence of PBB is related to:

- ✓ bacterial biofilm formation in the airway

  A biofilm is a matrix secreted by some bacteria that is thought to enhance attachment, facilitate access to nutrients and decrease antibiotic penetration

- ✓ impaired mucociliary clearance
- ✓ systemic immune function defects
- ✓ airway anomalies and malacia

Protracted Bacterial Bronchitis

In PBB, it is often found that more than one organism is identified in bronchoalveolar lavage (BAL) samples (even viruses ??rhinovirus, adenovirus, (RSV) and parainfluenza virus)

What are the Clinical Features of PBB?

Typically children with PBB are young - the majority of related studies involve children less than 6 years old.

Helpful questions:

1. Does he sound like a smoker first thing in the morning?

1. When did he have cough?

✓persistent cough

✓cough is typically worse when changing posture, just after lying down in bed and first thing in the morning

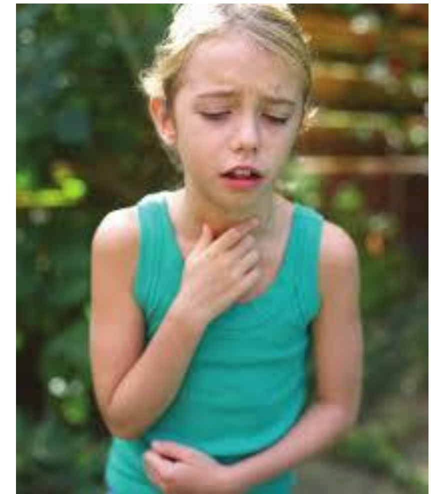
What are the Clinical Features of PBB?

- Parents often describe their child becoming short of breath and coughing with exercise.
- Gasping for breath
- It is also common to report that a child has a 'wheeze'? (ruttle)
- A viral infection will exacerbate both asthma and PBB.
- Introduction of a treatment such as an inhaled corticosteroid for a child with probable asthma or antibiotics for PBB is necessary to help confirm a presumptive diagnosis.

Protracted Bacterial Bronchitis

- Children with PBB generally do not look unwell but agitated resulting from disturbed sleep
- Parents often report that antibiotics have not helped but on closer questioning it may be that the cough was improving, with symptoms worsening quickly when the antibiotics were stopped.

When and How to Diagnose PBB?



- History
- Physical examination
- Chest Xray Normal?
  - ✓ May have only minor abnormalities such as peribronchial wall thickening
  - ✓ Hyperinflation is uncommon
- Cough swabs can be useful but have a relatively low sensitivity
- Basic immune function tests
- Tuberculosis?
- Pulmonary Function Tests

Protracted Bacterial Bronchitis

Chest radiograph

When and How to Diagnose PBB?

The definitive investigation

Flexible Bronchoscopy with BAL

When and How to Diagnose PBB?

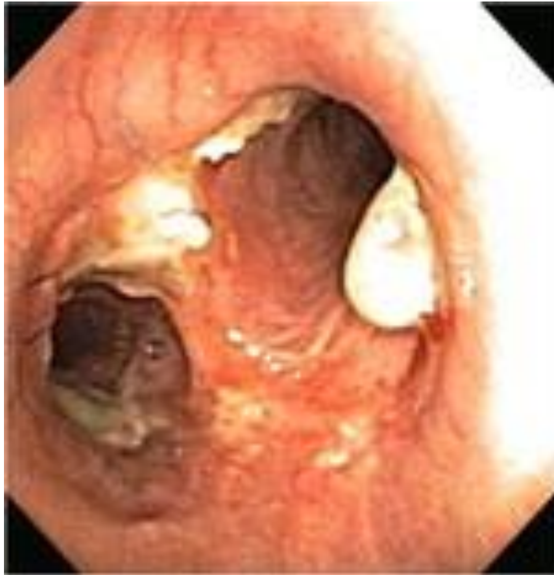
- Typically, we find secretions and edematous collapsible **bronchi** that collapse during suctioning while undertaking a BAL
- Antibiotic usage often results in a negative culture, even in a child with significant symptoms
- Positive cultures can be seen despite recent antibiotic use

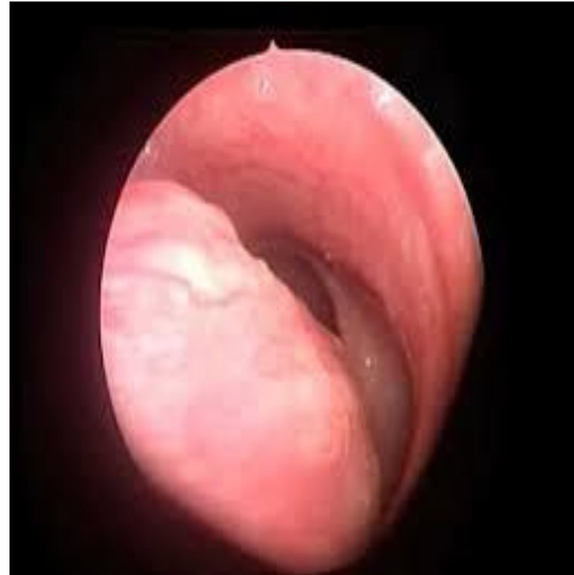
BAL

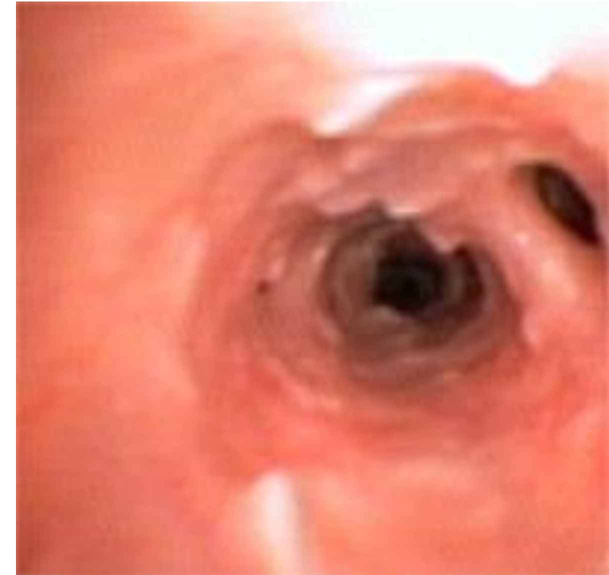
Bacterial counts ≥104 colony-forming units (CFU)/ml +/- neutrophils >3.5% in BALF consider as positive result

The normal reference values for BAL: macrophages 80–95%, neutrophils <3.5%, lymphocytes <15%, eosinophils <1%

How is PBB Treated?







When and How to Diagnose PBB?

The original diagnostic criteria for PBB includes:

✓(a) wet cough >four weeks duration,

✓(b) identifiable lower airway bacterial infection on broncho-alveolar lavage (BAL) culture,

✓(c) response to antibiotics (amoxicillin/clavulanate) with resolution of cough within two weeks,

✓(d) the absence of an alternative specific etiology

Protracted Bacterial Bronchitis

- If left untreated, PBB may develop into chronic suppurative lung disease (CSLD) in some children and possibly bronchiectasis
- PBB is often misdiagnosed as bronchial asthma or bronchial pneumonia (more than 70% Vs 2%), because pediatricians lack awareness of the disease.

Treatment

- This is largely an evidence-free zone
- Rx with Antibiotics is beneficial, with one clinical cure for every three children treated
- The aim of treatment is to eradicate bacteria and to allow regeneration of the epithelium
- Two weeks of high dose antibiotics such as co-amoxicillin/clavulanic acid will lead to resolution of the cough and a dramatic improvement in the child's quality of life, however recurrence of symptoms is described

Protracted Bacterial Bronchitis

- The use of pneumococcal conjugate vaccines has not reduced the incidence of this condition
- Physiotherapy to improve clearance
- DNAse and osmotic agents may help restore mucociliary clearance
- Asthma Rx

Pediatric Bronchoscopy

This presentation was prepared by Prof. Mohammad Ashkan Moslehi and reviewed for accuracy and content by members of the *WABIP Pediatric Section*