Management of Severe Acute Asthma & COPD

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Management of Severe Acute Asthma (Objectives)

- When do you call asthma acute and severe?
- What makes the attack, so severe?
- What important factors to be considered in the history of the patient?
- Are you sure that patient's problem is acute severe asthma and not other?
- What signs predict severity of asthma?
- What is the line of treatment?
When do you call asthma acute and severe?

- Acute severe asthma is an asthmatic attack that is severe at its onset and progresses despite standard therapy and may result into respiratory failure and even death.

- *Life threatening asthma, near fatal or fatal asthma or moribund asthma.*
What makes the attack, so severe?

- Hypoxemia
- Hyperinflation
  1. Lung Mechanics
- Cardiopulmonary effects
What factors in the history suggest the risk of developing fatal asthma?

- Previous history of life threatening asthma
- Previous history of ICU admission
- Heavy use or increasing dose of B2 agonist
- Under use of inhaled steroids
- Psychiatric illness – marked anxiety and depression
- Illicit drug use
- Lack of an asthma self management plan
Are you sure that patient's problem is acute severe asthma and not other?

- Left ventricular failure
- Vocal cord dysfunction syndrome
- Acute exacerbation of COPD
- Laryngeal / tracheal / bronchial obstruction
- Recurrent pulmonary embolism
- Viral bronchiolitis in young children
- Laryngotracheobronchitis (croup)
- Hypersensitive pneumonitis
What signs predict severity of asthma?

- Increasing wheeze and breathlessness
- Unable to complete a sentence in one breath.
- Patient is not able to lie down and is restless.
- Respiratory rate > 30 breath per minute.
- Heart rate > 120 beat per minute
- PEFR < 40 percent of predicted normal or < 120 liter/min.
- Pulsus paradoxus > 15 mm Hg.
Life threatening asthma is characterized with following:

- PEF < 33% or <120 L
- A silent chest, cyanosis or feeble respiratory efforts
- Exhaustion, confusion and coma
- ABG analysis
  1. hypoxemia, \( \text{Po2} \geq 55 \text{mmHg} \) or less
  2. normal or high \( \text{Pco2} \)
  3. Low Ph
What is the line of treatment for severe acute asthma

- **Oxygen**

1. It should be used in high concentration
2. CO2 retention is not *usually* a risk factor with acute asthma
3. Oxygenation guidelines should target Sats. & PO2
4. Humidified oxygenation
What is the line of treatment for severe acute asthma

• Systemic Steroids

1. Oral steroids are as effective as IV
2. Dose 30mg to 60 mg of Prednisone
3. Solumederol 125mg IV
4. Hydrocortisone 200mg IV stat

Nebulized corticosteroids are not recommended
What is the line of treatment for severe acute asthma

**Inhaled Beta Agonist**

- Nebulized with oxygen
- 2.5mg q 20 min OR 20mg/hr
- MDI 4 puffs q 10 min Aprox. 2.5-2.6mg/hr

**Contraindicated**

- Beta blockers
- NSAIDs
- Aspirin
- Adenosine
- Sedatives without assisted mechanical ventilation
What is the line of treatment for severe acute asthma

- Salbutamol infusion (5 micrograms/min)
- Terbutaline infusion (1.5-5 micrograms/min)
- Terbutaline nebulizations, subcutaneous
- Levosalbutamol is preferred due to fewer side effects
- Adrenaline infusion, nebulizations
- Adrenaline subcutaneous
What is the line of treatment for severe acute asthma

- **Anticholinergics**
  - Ipratropium bromide has an additional bronchodilatory effect
  - MDI 4 puffs (80ug) q 10 min.
  - Nebulizer 500ug q 20 min
  - Role of tiotropium has not been defined in acute setting
What is the 2nd line of treatment for severe acute asthma

**Aminophylline infusion**

Loading dose 5mg/hr over 20 min.
Maintenance dose 0.5-0.9mg/hr
Lower doses in following
1. Liver diseases & Cardiac failure
2. Cimetidine
3. Macrolides
4. Fluroquinolones
What is the 2\textsuperscript{nd} line of treatment for severe acute asthma

- **Magnesium sulphate** 1g-2g IV over 20min.
- **Inhalation of anesthetic agents**
  - Halothane, isoflurane, sevoflurane
  - Reduces pulmonary vascular tone with resulting decrease in PA pressures and peak airway pressure
What is the 2\textsuperscript{nd} line of treatment for severe acute asthma

- Helium & oxygen (heliox) may reduce work of breathing because of its low density
- BAL by removal of mucus plugs can reduce airway pressure dramatically
- NO (nitric oxide) dilates PA and improve V/Q mismatch
Further investigation in the ICU

- Blood count, electrolytes including Mg, PO4 & CA
- Renal profile
- EKG
- CXR R/O pneumothorax
What is the 2\textsuperscript{nd} line of treatment for severe acute asthma

• Role of non invasive mechanical ventilation
  • It is not well studied
  • It reexpands atelectatic
  • promotes removal of secretions
  • Decreases airway resistance
  • It give rest to inspiratory muscles
Indications for Assisted ventilation

- Cardiopulmonary arrest
- Increasing hypercapnia
- Worsening acidosis
- Increasing respiratory distress, exhaustion
Modes of ventilation

• Pressure control mode
  Maximum airway pressure is set and delivered tidal volume depends upon lung compliance

• Volume control mode
  It delivers set tidal volume regardless of compliance
  It can be safely used if airway pressure limit is set appropriately
Initial ventilator setting

- FiO2 100%
- Low Tidal Volumes 5-7ml/kg
- I:E ratio > 1:2 (prolonged expiratory time 4 sec)
- Low ventilator rate 10-12 breaths /min
- Short inspiratory time (inspiratory flow rate 70-100L/min)
- Minute ventilation of about 115 ml/kg
- Set inspiratory pressure 30-35cm H2O on PCV
- Peak inspiratory pressure alarm < 40 cm H2O on VCV
Mechanical ventilation

- Permissive hypercapnia

- Contraindications to permissive hypercapnia
  1. Raised intracranial pressure
  2. Acute MI
  3. Pregnancy acute hypercapnia should be avoided
Anesthetic agents and Sedatives

- Etomidate and thiopantone
- Midazolam
- Propofol
- Ketamine

1. Sympathomimetic and bronchodilating properties
2. 1-2 mg/kg iv over 4 min.
Anesthetic agents and Sedatives

- Paralytic agents are administered to
- Facilitate synchronization with the ventilator
- To avoid excessive hyperinflation
- Permissive hypercapnia
- Myopathy and muscle weakness is well known complication of non depolarising NMBA
- Incidence 30%
- Use should be kept to minimum
Acute exacerbation of COPD

- Define COPD
- Define COPD exacerbation
- Factors associated with increased risk for exacerbation
- Frequent causes of COPD
- What is the line of treatment?
- What is NOT the line of treatment?
Definition COPD

- A disease state characterized by airflow obstruction that is no longer fully reversible and is usually progressive.

- It does not incorporate the terms chronic bronchitis and emphysema into the definition.

- An asthma because of its different inflammatory mediator is not included under the term COPD.

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COPD exacerbation

- As an event in the natural course of the disease characterized by

- A change in the patient's baseline dyspnea, cough, and/or sputum that is beyond day to day variation

- Acute in onset

- May warrant a change in regular medications

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Frequent causes of an acute exacerbation COPD

- Respiratory infection

  Bacterial infections
  - Pseudomonas aeruginosa (15%)
  - Hemophilus influenza (22%)
  - Streptococcus pneumoniae (10%)
  - Moraxella catarrhalis (9%)
  - Mycoplasma & chlamydia <10%
Frequent causes of an acute exacerbation COPD

- Respiratory infection
  - Viral infections
  - Virus can be detected in 40% of exacerbation
  - Rhinovirus
  - RSV
  - Corona Virus
  - Influenza and para influenza
- It produces more severe symptoms and tends to last longer
Frequent causes of an acute exacerbation COPD

- **Environmental factors**
  - There is an increase in hospital admissions with high levels of air pollutants.
  - Small increase in SO2 & airborne particle increases ER COPD visits during winter and summer by 6% and 9% respectively.

- **Idiopathic**
Factors associated with increased risk for exacerbation

- Increased age
- Severity of airway disease
- Frequent past exacerbations
- Daily cough and wheeze
- Hypercapnia
- Hypoxia

- Co morbid heart disease
- Right ventricular failure
- Low serum albumin
- Persistent symptoms of chronic bronchitis
What is the line of treatment?

**Inhaled Bronchodilator / Anticholinergic Therapy**

- An increase in the dose or frequency is the mainstay of therapy
- Although often used in combination, there is a marginal improvement
- Nebulizers are often preferred in dyspneic patients
- Nebulizers for COPD should be driven on compressed air rather than oxygen
- Patients prescribed LABA could continue this therapy but there is little evidence to support introducing LABA during an AE
What is the line of treatment?

- **Systemic corticosteroids are indicated in all but the mildest of AE**
  - A more rapid improvement in FEV1 after administration of steroids
  - Oxygenation, Hospitalization, and length of hospital stay are more variable
  - Effect on mortality has not been well documented
  - Use of systemic steroids may delay the time to subsequent exacerbation
  - Generally oral prednisone is used at a dose between 30 and 40 mg
  - Many physicians choose to give the first dose intravenously

- **Inhaled corticosteroids have an important role in AE prevention**
What is the line of treatment?

**Oxygen Therapy**

- O2 is indicated to correct the hypoxemia that may occur with AE.
- O2 should be administered in a controlled manner with monitoring of ABG or saturations to avoid CO2 retention.
- Studies have shown little risk of hypercapnia if oxygen is titrated to a maximum saturation of 90–92%.
- Failure to correct hypoxemia to > 90% with Fio2 > 40% suggests the presence of additional pathology such as pulmonary embolus.
- Venturi masks provide a more reliable FiO2 than nasal cannulae.
What is the line of treatment?

• **Antibiotics**
  • Benefit only when there is an increase in at least two of the following three symptoms
    1. Breathlessness
    2. Sputum volume
    3. Sputum purulence
  • Local resistance patterns and antibiotic policies should dictate the choice of drug
  • Coverage should include the common pathogens
  • An oral amino penicillin, macrolide or fluoroquinolones
  • There are little data on the optimal duration of therapy
What is the line of treatment?

**Noninvasive Ventilation**

- The large trial of Bipap in general respiratory floor
- Patients Ph (7.2 -7.25)
- Standard therapy + NIPPV
- Significantly reduced the need for intubations 27% VS. 15%
- Inpatient rate of mortality 20% VS. 10%

What is the line of treatment?

Other Therapies

• Methylxanthine drugs such as theophylline in randomized, controlled trials have failed to show any benefit in lung function or symptoms during AE

• They are still sometimes used in patients who are not responding on otherwise maximal therapy.
What is the line of treatment?

- **Invasive Ventilation Indications**
  
  - Severe hypoxia or respiratory acidemia (pH < 7.26) in a patient unsuitable for/or failing NIV
  
  - The decision to institute invasive ventilation
    1. The prior functional status of the patient
    2. The severity of the current and underlying illness
    3. Wishes of the patient and their families
    4. Mortality after invasive ventilation is approx. 20%

- **Weaning from the ventilator can be challenging**
What is NOT the line of treatment?

- There are no data to support the use of IV Salbutamol
- There are no data to support the use of mucolytic drugs
- There are no data to support strategies aimed at facilitating expectoration such as physiotherapy or saline nebulization
- Cough suppressants are contraindicated
- A limited role for doxapram may remain if NIV is not appropriate
- Routine use of intravenous magnesium is not recommended
- There is no evidence to support use of Heliox
Acute Exacerbation of COPD

- Increased dose and/or frequency of BRONCHODILATORS
- Oral CORTICOSTEROIDS
- ANTIBIOTICS if change in sputum
- Additional therapies (e.g., theophylline)
- MECHANICAL VENTILATION

Increasing severity of exacerbation
Any Questions?
THANK YOU
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