

Acute Chest Syndrome

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- 1) 12 yo African American male presents to ED with pain in the lower back and both feet. He has a h/o HBSS and multiple admissions due to VOCs. He normally presents with the same symptoms every time. He has no allergies. The pain started 6 hours ago and his pain meds at home were not effective. He is c/o 8/10 pain right now. His vitals: HR 110, BP 100/60, RR 32, Temp 38.7. CBC, Retic count, blood culture, U/A, urine culture was ordered and he was given morphine for his pain. After 1 hour his pain came down to 6/10. After another hour, he starts complaining of chest pain which is retrosternal, non-positional, non-pleuritic. He never had chest pain before. He has some increased work of breathing and retractions. A CXR is ordered and it comes back with positive with new infiltrate in right middle lobe. He is diagnosed with ACS.

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1)Infection

2)Pulmonary infarction

3)fat embolism

4)Musculoskeletal

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- b)What antibiotic therapy will you start on this patient?

1)3rd gen cephalosporin + macrolide

2)3rd generation cephalosporin + vancomycin

3)3rd generation cephalosporin + quinolone

4)Carbapenem

5) Clindamycin

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ACS

- **A new pulmonary infiltrate** detected by chest radiograph involving at least one complete lung segment that **is not consistent with the appearance of atelectasis**

AND one or more of the following signs or symptoms:

- Chest pain
- Temperature $>38.5^{\circ}\text{C}$
- Tachypnea, wheezing, cough, or the appearance of increased work of breathing (eg, retractions)
- Hypoxemia relative to baseline measurements

- **Explanation:** a) National Acute Chest Syndrome Study Group (NACSSG) evaluated 671 episodes of ACS in 538 patients. Infection (29%) was the most common *identifiable* cause. The following distribution was noted:
 - Unknown cause — 46 percent overall (30% with complete data)
 - Pulmonary infarction — 16 percent
 - Fat embolism, with or without infection — 9 percent
 - Chlamydophila (formerly Chlamydia) pneumoniae infection — 7 percent
 - Mycoplasma pneumoniae infection — 7 percent
 - Viral infection — 6 percent (eg, respiratory syncytial virus, parvovirus, rhinovirus)
 - Mixed infections — 4 percent
 - Other pathogens — 1 percent

- Causes that increase the chance of ACS:
 - 1) Multiple VOC
 - 2) Postoperative (abdominal surgery)
 - 3) H/O Asthma

- **Explanation:** b) Because infection is one of the most common causes of ACS, broad spectrum antibiotic coverage for all patients presenting with ACS is recommended especially if they have fever >38.5.
- Broad spectrum empiric coverage with a **third generation cephalosporin** (eg, cefotaxime or ceftriaxone) for bacterial coverage and a **macrolide** (eg, azithromycin or erythromycin) for coverage of atypical organisms (eg, mycoplasma and chlamydia) should be initiated immediately on admission.
- Clindamycin may be substituted if the child is **allergic to cephalosporins**.
- In the absence of severe or life-threatening pneumonia, generally treat for a total of **7 to 10 days**.

- 2. 14 yo African American male presents to ED with pain in the lower back and mid chest. He has a h/o HBSS and multiple admissions due to VOCs and 1 episode of ACS. The pain started 2 hours ago and his pain meds at home were not effective. He is c/o 10/10 pain right now. His vitals: HR 100, BP 124/84, RR 32, Temp 38.7, O2 sat 86%. CBC, retic count, CMP, blood culture, CXR, type/cross match was ordered and he was given ketorolac for his pain. Chest pain is retrosternal, non-positional, pleuritic. He has some increased work of breathing and retractions. He has diffuse wheezing on the left side. A CXR comes back with positive new infiltrate in right middle and upper lobe. He is diagnosed with ACS. He is started on O2 via NC 5L/min. His Sat goes up to 89%. Hb-6g/dl, Retic 4%, TC 16000, N56L30, Plt 240, Na 136, K 4.6, HCO3 31, Urea 16, Cr 0.5.

- What is the next best step in the management of this patient?
 - 1)Albuterol nebulization 3 cycles
 - 2)Exchange transfusion
 - 3)Increase oxygen via NC
 - 4)Corticosteroid therapy
 - 5)Normal saline bolus
 - 6)V/Q scan

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- **Explanation:** Exchange transfusion — Partial exchange transfusion or erythrocytapheresis should be performed for the following indications:
 - Severe hypoxemia
 - Multi-lobar disease
 - Previous history of severe ACS or cardiopulmonary disease

- In the NACSSG study, in which **72 percent of patients received transfusions** (two thirds of these were simple transfusions). In transfused patients breathing room air, the partial pressure of arterial oxygen increased from 63 mmHg before transfusion to 71 mmHg after transfusion, as did oxygen saturation (91 versus 94 percent).
- Simple and exchange transfusions resulted in **similar improvements** of oxygenation
- The goal of exchange transfusion should be to decrease the level of **Hgb S to <30** percent of the total hemoglobin concentration, while **not exceeding a Hgb level of >10 g/Dl**.

- **Normal saline bolus:** If dehydration is present, it should be corrected, as hypovolemia can contribute to increased sickling.
- Hypovolemia should be corrected with the administration of isotonic solution. Once it is corrected, euvolemia should be maintained using hypotonic oral and intravenous fluids
- **Overhydration** or rapid hydration should be **avoided** because they may result in **pulmonary edema or heart failure.**

- **Increase NC Oxygen therapy:** Respiratory support, including oxygen supplementation, should be provided to maintain arterial oxygen saturation ≥ 92 percent.
- For patients with poor respiratory effort or rising oxygen requirements, the use of **non-invasive ventilation**, such as nasal mask continuous positive airway pressure (**CPAP**) or bilevel positive airway pressure (**BPAP**), may be useful

- **V/Q scan:** May show pulmonary infarction, but time consuming.

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