Acute Respiratory Distress Syndrome

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KEYWORDS

• ARDS • Hypoxemia • Acute respiratory failure • Mechanical ventilation
• Ventilator-induced lung injury

HOSPITAL MEDICINE CLINICS CHECKLIST

1. The diagnosis of acute respiratory distress syndrome (ARDS) should be considered in all patients with pneumonia, trauma, or sepsis who develop acute hypoxemic respiratory failure. Important clinical features that should suggest ARDS include rapidly progressing respiratory failure (usually <3 days after onset of symptoms) with bilateral infiltrates on chest radiograph.
2. During the first week of ARDS, evidence of the proliferative phase appears on histology, with early fibrosis and interstitial inflammation. In patients with very prolonged ARDS (weeks), histology can show a fibrotic phase, with extensive fibrosis and disruption of alveolar architecture.
3. There are 2 basic principles to adhere to at the time of an ARDS diagnosis. First, use the optimal mechanical ventilation strategy; and second, identify and treat underlying reversible inflammatory causes.
4. When alveoli are overdistended by high tidal volume (or pressure), a mechanical and inflammatory injury ensues (volutrauma). The inflammatory consequences of volutrauma occur both locally in the lung and systemically, contributing to dysfunction in the lung and distant organs (eg, kidney, liver).
5. A large randomized controlled trial sponsored by the National Institutes of Health and conducted by the ARDS Network (ARDSnet) compared low tidal volume (6 mL/kg predicted body weight) with conventional tidal volume

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(12 mL/kg predicted body weight). A significantly lower mortality (31% vs 40%) was found in the patients with lower tidal volume.

6. The target plateau pressure for patients with ARDS is less than 30 cm H_2O.
7. Most clinicians consult a table to select fraction of inspired oxygen and positive end-expiratory pressure (PEEP) from those used in the ARDSnet trial for low tidal volume ventilation.
8. Hypercapnia is a consequence of the low tidal volume and the underlying disorder and should be tolerated as part of the support strategy (permissive hypercapnia).
9. Prone-position ventilation improves gas exchange in most patients, and has been used as salvage therapy for refractory hypoxemia.
10. Experts now recommend early use of prone-position ventilation in patients with moderate to severe ARDS.
11. Key elements to safe prone positioning include preprocedure preparation, experienced staff, and adequate personnel.
12. Prone-position ventilation with neuromuscular blockade is recommended early in ARDS, but it can also be used as salvage therapy for severe hypoxemia.
13. The use of fluid restriction and diuretics to avoid volume overload is an important component of ARDS management.
14. Once patients have achieved acceptable levels of oxygenation and PEEP, efforts should be made to reduce ventilator support.
15. Mortality in ARDS approaches 40% overall and correlates with nonpulmonary organ dysfunction and underlying causes. Respiratory failure without other organ dysfunction has a mortality of approximately 20%. Death caused by refractory hypoxemia is less common than multiorgan failure or withdrawal of life support in ARDS.
16. The most common respiratory symptom reported long term in patients with ARDS is exertional dyspnea.
17. Although most ARDS survivors recover most of their lung function, studies have shown incomplete recovery in functional status as much as 5 years later. Mobilizing patients early during critical illness, even while mechanically ventilated, may decrease subsequent neuromuscular complications.

RECOGNITION

How can clinicians recognize acute respiratory distress syndrome (ARDS)?

Patients should be evaluated for a diagnosis of ARDS when they are admitted to the intensive care unit (ICU) with escalating requirements for oxygen and abnormal chest radiographs, because this diagnosis is frequently missed by clinicians. This evaluation is especially important because there are beneficial therapies that reduce mortality and reduce the complications of ventilator support. In particular, the diagnosis of ARDS should be considered in all patients with pneumonia, trauma, or sepsis who develop acute hypoxemic respiratory failure. Important clinical features that should suggest ARDS include rapidly progressing respiratory failure (usually <3 days after onset of symptoms) with bilateral infiltrates on chest radiograph (**Fig. 1**).