Breathless After Cardiopulmonary Resuscitation: How Would You Diagnose This Patient's Respiratory Pattern?

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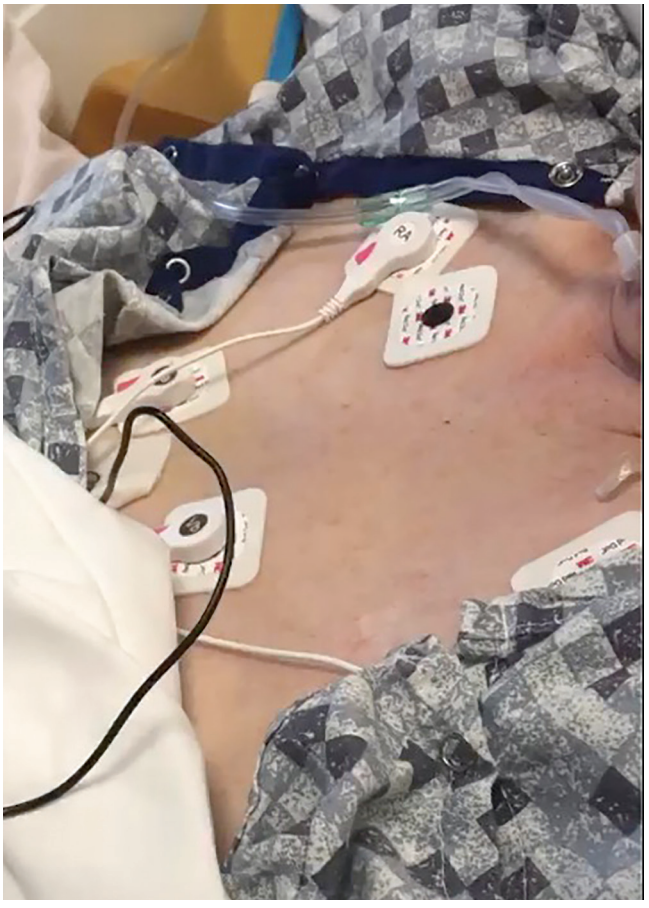
A 71-year-old woman with a history of chronic obstructive pulmonary disease (COPD), coronary artery disease, hypertension, and diabetes presented with dyspnea and septic shock. Volume resuscitation and antibiotics were given; however, she went on to develop progressive hypoxemia and went into cardiac arrest with pulseless electrical activity. Cardiopulmonary resuscitation (CPR) was initiated, with a total duration of 10 minutes before the return of spontaneous circulation. She was put on a ventilator and underwent extensive imaging studies; computed tomography scans showed pneumonia along with rib fractures. There was no evidence of pulmonary embolism.

Her condition gradually improved, and she was weaned from the ventilator. The patient self-extubated prior to a trial of spontaneous breathing through a T-piece. Shortly thereafter, she began to develop respiratory failure requiring bilevel positive-airway pressure (BiPAP). Every time she was taken off of BiPAP, she developed severe respiratory distress. The respiratory pattern shown in the **Video** (https://www.consultant360.com/video/consultant360/breathless-after-cardiopulmonary-resuscitation-how-would-you-diagnose-patients) was seen.

What's your diagnosis?



A. Tension pneumothorax
B. Nonintegrated chest wall
C. COPD exacerbation
D. Cardiac tamponade

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CITATION:
Chaudhry B, Malek A, Alekseyev K. Breathless after cardiopulmonary resuscitation: how would you diagnose this patient's respiratory pattern? *Consultant.* Published online December 29, 2020. doi:10.25270/con.2021.01.00003
Received August 5, 2020. Accepted November 18, 2020.

DISCLOSURES:
The authors report no relevant financial relationships.

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Answer: Nonintegrated Chest Wall

A nonintegrated chest wall, or "flail chest," is due to trauma when 2 or more contiguous ribs are broken in at least 2 places—a common result of chest compressions during CPR.[1] This leads to chest wall destabilization and paradoxical rib cage movement. Not only will negative inspiratory force created by the diaphragm attempt to draw in air, but also the inspiratory effort will draw in the unstable "floating" portion of the chest. This will lead to a decrease in tidal volume, leading to hypoxemia, hypercarbia, and respiratory failure.

The diagnosis is made by inspection of the rib cage and noting paradoxical movement of the chest wall area inward rather than outward during inspiration. In mechanically ventilated patients or in patients receiving noninvasive ventilation, the diagnosis may not be appreciated.

Treatment includes pain management and positive-pressure ventilation.[1] Surgical treatment options for rib fixation can also be attempted.[1,2]

As for the differential diagnosis, this patient does not have a pneumothorax, where one would see expansion of the affected hemithorax and a shift of the trachea to the contralateral side. With COPD exacerbation, a patient would have increased thoracic expansion along with accessory muscle use, decreased air movement, and a prolonged expiratory phase. In cardiac tamponade, one would see jugular venous distention, marked hypotension, and muffled heart sounds (the Beck triad). ■

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