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POSTOBSTRUCTIVE PULMONARY EDEMA IN THE SETTING OF ASPIRATION AND AIR TRAVEL

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☐ **Abstract—Background: Postobstructive pulmonary edema (POPE)—also referred to as negative pressure pulmonary edema—occurs with deep inspiration against a closed glottis or obstructed airway. The result can be life threatening, however, most cases have a self-limited presentation and resolve with supportive care. Objective: Our aim was to critically evaluate a previously unreported mechanism in the exacerbation of POPE. Case Report: This is a report of a 50-year-old woman who experienced an acute episode of hypoxia and altered mental status aboard a transcontinental flight. Her presentation was suggestive of pulmonary embolus. However, a detailed history yielded an episode of preflight choking relieved by the Heimlich maneuver. After 2 days of supportive care she was discharged with a complete return to baseline. Conclusions: Subclinical cases of POPE can be exacerbated by the low atmospheric pressure experienced on commercial airlines. With early recognition and supportive treatment, the patient returned to baseline before her discharge 2 days later. Making the diagnoses of POPE is not always straightforward for the practitioner and necessitates a broad differential. Initial supportive care focusing on maximizing respiratory support is critical. © 2014 Elsevier Inc.**

☐ **Keywords—pulmonary edema; acute obstruction; aspiration; Heimlich maneuver; postobstructive pulmonary edema; POPE; NPPE; case report**

INTRODUCTION

Postobstructive pulmonary edema (POPE)—also referred to as negative pressure pulmonary edema (NPPE)—is a potentially life-threatening complication after acute airway obstruction. The process is the result of a marked increase in negative intrathoracic pressure due to forced inspiration against a closed glottis or obstructed airway. This results in transudative pulmonary edema (1,2). Radiographic features usually occur within minutes of the event and resolve within 12 to 24 h with no long-term sequela (3). The pathophysiology of POPE appears to be self-limited and resolves on its own or with limited supportive therapy (4).

CASE REPORT

A 50-year-old woman with a noncontributory medical history presented to the emergency department (ED) by emergency medical services (EMS) with altered mental status (AMS). The patient and her family were on a layover during a transcontinental flight. During that time, she choked while eating a McDonalds Chicken McNugget®. After approximately 30−45 s with the patient not moving air, her husband (who is medically

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trained), dislodged the obstruction with the Heimlich maneuver. After the maneuver, she was breathing well with no cough or shortness of breath. She was mentating at baseline and boarded the next flight.

Twenty minutes into the flight, she began to experience a cough and chest pain with deep inspiration. During the next hour, she began to feel sleepy and confused, and then became unresponsive. Her husband thought she was sleeping, so no intervention was initiated. On landing, she was lethargic, altered, but arousable. She was transported off the plane by EMS.

EMS reported that she was obtunded. Her blood pressure was 140/74 mm Hg, pulse was 104 beats/min, oxygen saturation 98% on non-rebreather mask, and fingerstick glucose was 90 mg/dL. Room air oxygen saturation was not obtained. EMS performed no other intervention. The patient's mental status showed a slight improvement en route, to moving all four extremities and "mumbling."

On arrival to the ED, she was obtunded with a temperature of 38.1°C, blood pressure was 130/70 mm Hg, pulse was 100 beats/min, and respirations were 20 breaths/min. Oxygen saturation was 94% on room air immediately after being taken off of the non-rebreather mask. The physical examination revealed a lethargic, well-appearing, grossly obese female. She was nontoxic-appearing with a Glasgow Coma Scale score of 12 (E- 3, V- 4, M- 5). The patient was moving all extremities with weak, but purposeful movement. She had slurred speech, but was saying several words. Her airway was intact and she did not appear to be in respiratory or circulatory distress. She had normal breath sounds bilaterally with no stridor, wheezes, rhonchi, or rales.

An initial bedside ultrasound yielded a normal examination. A portable chest x-ray showed diffuse bilateral airspace opacities (Figure 1A). At this time, the differential included acute intoxication, pulmonary embolism, neurogenic pulmonary edema, pulmonary edema due to congestive heart failure, pneumonia, aspiration pneumonitis, and lung injury due to unknown cause. However, laboratory results evaluating B-type natruretic peptide, troponin, myoglobin, comprehensive metabolic panel, and complete blood count were clinically insignificant. In addition, urine drug screen as well as serum ethanol, acetaminophen, and salicylate levels were negative. These were followed by a negative computed tomography (CT) scan of the brain.

A CT scan with intravenous contrast of the chest was ordered. It revealed diffuse ground glass infiltrates with subpleural sparing, concerning for aspiration vs. diffuse alveolar damage (Figure 1B).

After CT imaging, and almost 2 h after the initial evaluation, the patient's oxygen saturation dropped to 91%, she was placed on 2 L nasal cannula. Her oxygen saturation rose to 99% and, at that point, her mental status returned to baseline for the first time since boarding the flight. She was then able to recount the events of the day and gave a history of progressive weakness and somnolence beginning 20−30 min into the flight. At this point, she experienced a period of amnesia and could not recall any events until the time of landing, where she remembered only being able to speak one or two words.

The patient was admitted for supportive care and observation. Six hours into the hospital course, the patient's vital signs normalized and a repeat chest x-ray < 24 h after presentation showed complete resolution in the previous findings. After an uneventful 24-h course in the medical intensive care unit and another day on the floor, she was discharged with a full return to baseline and no evidence of persistent underlying illness.

DISCUSSION

POPE was first described in a 1973 case report of a choking pediatric patient (5). In 1977, it was described in adults

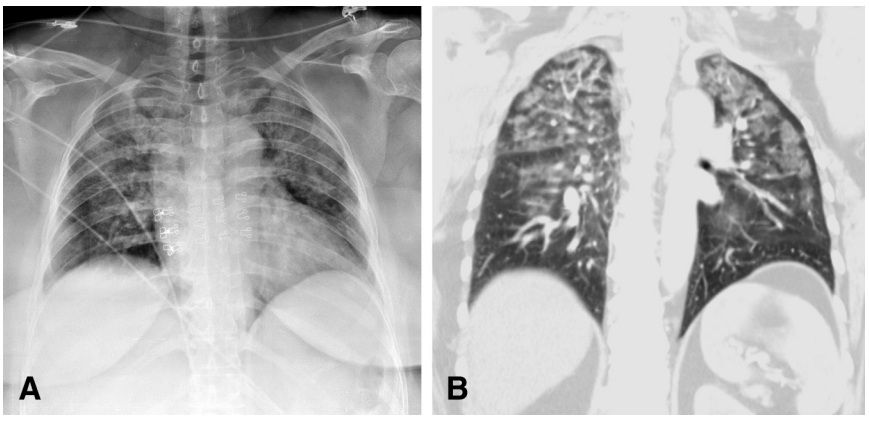

Figure 1. (A) Portable chest x-ray showing diffuse bilateral airspace opacities. (B) Computed tomography of the chest showed disseminated pulmonary changes suggestive of edema.