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Blood clot bronchial cast causing airway obstruction during tunneled dialysis catheter placement

Amanda M Marsh, Slee Yi, Andrew Toma, Jesus Jimenez

CASE REPORT

A 52-year-old female initially presented with several days of cough and shortness of breath. Pertinent past medical history includes diabetes mellitus, obesity, hypertension, human immunodeficiency virus (HIV), and chronic kidney disease stage III. Upon arrival, she was afebrile with signs of respiratory distress and a Leukocytosis of $18 \times 10^3/mm^3$. Computed tomography (CT) scan of the chest showed bilateral ground glass opacities (Figure 1). The patient was started on broad spectrum antibiotics, but her condition failed to improve. Labs resulted positive for *Mycoplasma pneumoniae* immunoglobulin M (IgM). The patient developed progressive hypoxemic respiratory failure requiring intubation and mechanical ventilation. Despite two negative SARS-CoV-2 nucleic acid tests, the patient was kept in respiratory isolation with a negative pressure room and airborne precautions. Her course was complicated by persistent hypoxemia leading to prolonged ventilator support and acute on chronic kidney injury requiring hemodialysis.

The patient was scheduled for tracheostomy, as well as gastric tube placement for tube feeding and tunneled dialysis catheter placement for hemodialysis. She was brought to the operating room intubated and general anesthesia was induced. Under ultrasound guidance, the right internal jugular vein was accessed with a micropuncture needle and a wire was inserted. At this time, the patient suddenly developed elevated peak airway pressures with reduction in tidal volumes as well as worsening hypoxemia with desaturations to 80% on pulse oximetry. No arrhythmias were appreciated on the monitor. The tunneled dialysis catheter was quickly placed by tunneling from the right chest down to the junction of the superior vena cava and right atrium using fluoroscopy. The catheter was secured in place, however there was no improvement in the patient's oxygenation or ventilation.

Immediate chest X-ray was not available, and fluoroscopy could not delineate the presence of a pneumothorax. With concerns for iatrogenic pneumothorax or hemothorax, an emergent 32 French chest tube was placed along the right anterior axillary line into the chest cavity. A small amount of serosanguineous fluid was evacuated without a significant rush of air after opening the chest. No pneumothorax was identified on formal chest X-ray (Figure 2). Following chest tube placement, blood was seen within the endotracheal tube and copious bloody secretions were suctioned from the airway with only mild improvement in ventilation. The patient continued to have worsening hypoxemia with high end-tidal CO_2 as well as elevated peak airway pressures up to 60.

Given the lack of available therapeutic options, flexible bronchoscopy was performed and revealed extensive blood clot with near complete obstruction of the airway at the carina (Figure 3). The clot was unable to be removed with saline and suction therefore therapeutic bronchoscopy was performed with forceps to attempt to break up the clot. Bronchoscopy using different techniques with forceps and suction was attempted until extensive clot was extricated from the endotracheal tube (Figure 4). The patient experienced immediate improvement in oxygenation and ventilation and was stabilized for transfer back to the Intensive Care Unit. Postoperative chest X-ray showed worsening of bilateral pulmonary infiltrates, without pneumothorax or pleural effusion. The blood clot specimen was sent for pathology and histology revealed fragments of fresh blood clot. Despite diagnostic efforts, the etiology remained unidentified but was likely self-limited bleeding in the setting of severe respiratory disease.

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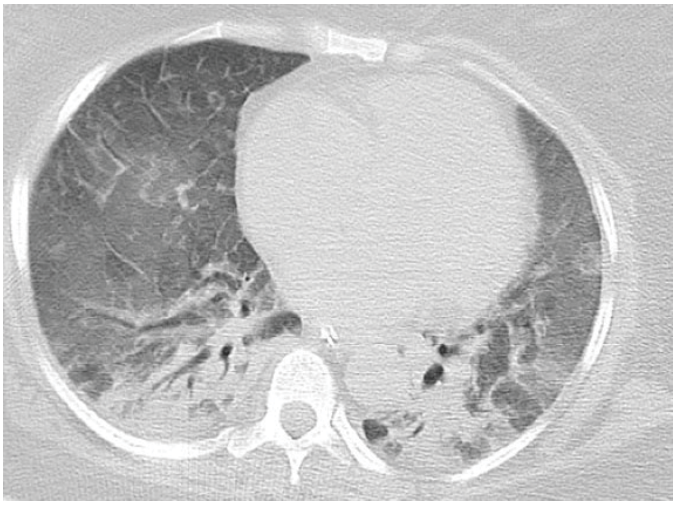

Figure 1: Preoperative chest CT scan showing bilateral ground glass opacities with dense consolidations at the bases.

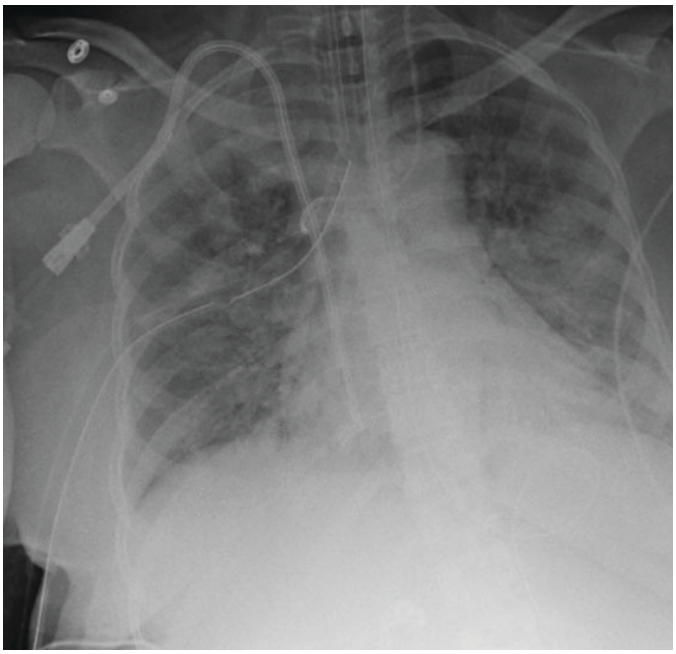

Figure 2: Postoperative chest X-ray confirming placement of right tunneled dialysis catheter and chest tube. No pneumothorax or pleural effusion identified.

Figure 3: Flexible bronchoscopy through endotracheal tube. Blood clot seen in the distal trachea causing near complete obstruction at the carina.

Figure 4: Blood clot bronchial cast extracted from the right and left mainstem bronchi maintaining the integrity of the bronchial tree.

DISCUSSION

Acute airway obstruction is a medical emergency that can result in significant morbidity and mortality and requires prompt identification of the cause, location, and degree of obstruction [1]. In mechanically ventilated patients, blood clots may form insidiously within the airway before presenting as fulminant airway obstruction. The blood clot causes a ball-valve effect that leads to a potentially fatal rise in intrinsic positive end-expiratory pressures and manifests as an isolated sudden rise in peak airway pressures with normal plateau pressures [2, 3].

High peak airway pressures seen in mechanically ventilated patients can lead to potentially lethal complications if not promptly identified and treated. While the differential for elevated peak airway pressures is extensive, the immediate life-threatening complications include auto positive end-expiratory pressure (PEEP), tension pneumothorax, acute respiratory distress syndrome, obstructed endotracheal tube, and large mucus plugs [4]. In patients requiring mechanical ventilation, blood clots typically present with clinically significant

hemoptysis. Common etiologies for hemoptysis may include anticoagulant medications, bleeding diathesis, bronchiectasis, infection, alveolar hemorrhage, malignancy, and autoimmune disease [2, 5]. These blood clots may present as bronchial casts, which are comprised of red blood cells and fibrin that line the airway lumen and preserve the shape of the bronchial tree [6].

The emergent management of blood clot bronchial casts is not standardized. Review of the literature suggests when available, rigid bronchoscopy offers superior access to bronchial casts with forceps and suction catheters in experienced hands. Other therapeutic approaches include bronchoscopic clot retrieval using saline irrigation and suction, forceps, cryotherapy, topical thrombolytic administration, Fogarty embolectomy, or endotracheal tube exchange [2, 3, 7]. However, the removal of bronchial casts should be attempted with extreme caution as the procedure may cause acute obstruction of the endotracheal tube or recurrent hemoptysis.

We suspect that this large blood clot was dislodged and unmasked during tunneled dialysis catheter placement with the use of heparinized saline. Unfortunately, no bronchoscopy had been performed preoperatively to determine the timing of blood clot formation and chest radiographs did not reveal evidence of airway obstruction. After tension hemopneumothorax was ruled out with chest tube placement, fiber-optic bronchoscopy was the next diagnostic approach available for the patient's ventilatory failure. Given the emergent nature and intraoperative setting, resources for rigid bronchoscopy were unavailable. Therefore, therapeutic bronchoscopy was used with various extraction techniques until the source of airway obstruction could be removed.

In performing any procedure, it is important to identify the potential risks and complications. Central venous access and tunneled dialysis catheter placement can lead to life-threatening complications that must be immediately addressed. While there is a comprehensive differential diagnosis for elevated peak airway pressures in mechanically ventilated patients, it is key to rapidly identify and treat etiologies that can lead to rapid clinical deterioration. Bronchoscopy is a reliable diagnostic and therapeutic approach to identify causes of airway obstruction when the etiology is unclear. When available, ultrasound can also be utilized to identify lung sliding or large pleural effusions. However, given the lack of standardized treatment for bronchial cast formation, further evidence is required to develop a systematic approach, especially for patients on mechanical ventilation.

CONCLUSION

We describe a rare case of blood clot bronchial cast formation leading to airway obstruction found during tunneled dialysis catheter placement. Bronchial casts may present as acute airway obstruction that presents as elevated peak airway pressures with normal plateau pressures. Although rare, bronchial cast formation should be included in the differential diagnosis for acute ventilatory failure.

Keywords: Airway obstruction, Blood clot, Bronchial casts, Bronchoscopy, Respiratory failure

How to cite this article

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REFERENCES

1. Wong P, Wong J, Mok MUS. Anaesthetic management of acute airway obstruction. Singapore Med J 2016;57(3):110–7.
2. Coughlan CH, Matharu RS, Kuczynski T, Stumpfle R. Bronchial cast extrication in an intubated and ventilated patient. BMJ Case Rep 2019;12(11):e232181.
3. Foucher P, Merati M, Baudouin N, Reybet-Degat O, Camus P, Jeannin L. Fatal ball-valve airway obstruction by an extensive blood clot during mechanical ventilation. Eur Respir J 1996;9(10):2181–2.
4. Covert T, Niu NT. Differential diagnosis of high peak airway pressures. Dimens Crit Care Nurs 2015;34(1):19–23.
5. Okada Y, Okada A, Narumiya H, Iiduka R, Katsura K. Bloody bronchial cast formation due to alveolar hemorrhage associated with H1N1 influenza infection. Intern Med 2017;56(20):2747–51.
6. Annangi S, Smith KH. Bloody bronchial cast—Aftermath of hemoptysis. Am J Respir Crit Care Med 2020;201(2):243–4.
7. Mondoni M, Carlucci P, Cipolla G, et al. Bronchoscopy to assess patients with hemoptysis: Which is the optimal timing? BMC Pulm Med 2019;19(1):36.

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Author Contributions

Amanda M Marsh – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related

to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Slee Yi – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Andrew Toma – Analysis of data, Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Jesus Jimenez – Analysis of data, Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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Conflict of Interest
Authors declare no conflict of interest.

Data Availability
All relevant data are within the paper and its Supporting Information files.

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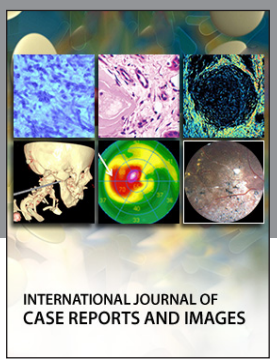

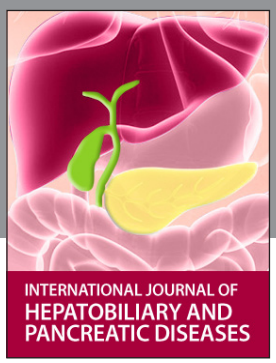

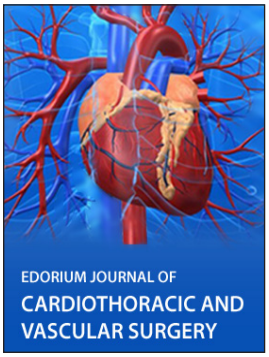

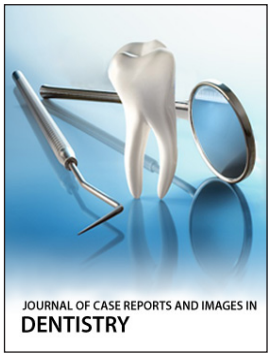

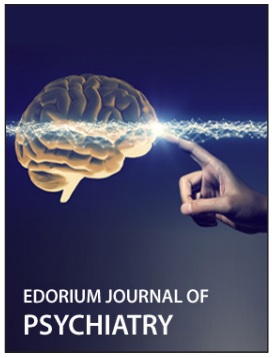

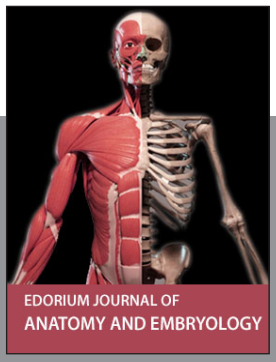

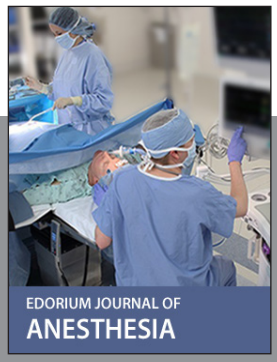

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