Title: Recognizing barotrauma as an unexpected complication of high flow nasal cannula

Introduction:

Spontaneous pneumomediastinum (SPM) is a rare condition defined as free air in the mediastinum without an apparent trauma. It is commonly associated with barotrauma in asthma and COPD patients. High flow nasal cannula (HFNC) has been routinely used for hypoxemic respiratory failure. We present a case of the development of SPM with extensive subcutaneous emphysema with the use of HFNC for hypoxic respiratory failure.

Case Presentation:

78 year old Caucasian female with history of interstitial pulmonary fibrosis and COPD was discharged to LTACH after prolonged hospitalization for influenza-A infection complicated by acute on chronic respiratory failure. She was started on supplemental oxygen using HFNC that was progressively increased to 60 liters/min with 100% FiO2 for persistent hypoxia. Over the next four days, she was noted to have worsening facial and neck swelling with progressive dyspnea leading to transfer to the hospital. CT scan of chest noted for extensive pneumomediastinum involving the middle and anterior mediastinum with extensive subcutaneous emphysema throughout the anterior and moderately posterior chest wall extending to lower neck. Lung parenchyma revealed underlying interstitial with patchy airspace disease without evident pneumothorax. She was started on 100% FiO2 with non-rebreather mask. For symptomatic relief, Cardiothoracic surgery performed bilateral anterior chest blowhole incisions and application of negative vacuum-assisted closure on anterior chest with dramatic improvement in subcutaneous emphysema and facial swelling with persistent pneumomediastinum. Patent’s pneumomediastinum and respiratory failure persisted with high oxygen requirement with non-rebreather mask. Due to underlying advanced lung disease and persistent respiratory failure, patient’s family opted for palliative management with comfort measure and patient was transferred to hospice care.

Discussion:

This case highlights that the fact that HFNC therapy should be used cautiously and can potentially case barotrauma especially with high oxygen flow rates. SPM and Subcutaneous emphysema has been reported in the pediatric population with use of HFNC. Study on HFNC has shown incremental increase in airway pressure associated with increasing flow. Conventionally, HFNC has been known to deliver PEEP of 3 to 7 cm H2O and this PEEP effect is negated with mouth opening. This PEEP effect can lead to barotrauma especially with high oxygen flow rates like our patient.

Conclusion:

This case highlights that the fact that HFNC therapy should be used cautiously and can potentially case barotrauma especially with high oxygen flow rates. There is a need to establish distinct precautions and guidelines for the use of HFNC.