

Blood Clot Causing a Valve Effect in a Tracheostomy

Dear Editor,

Percutaneous tracheostomy is commonly done in critically ill patients in the intensive care as compared to open tracheostomy. It is known to be associated with lower incidence of peristomal bleeding and infection as compared to open surgery.¹⁻⁴ Patients on anticoagulation may develop haematoma spontaneously in their airways causing airway obstruction.⁵ However there is no contraindication to perform percutaneous tracheostomy^{6,7} in a patient previously on anticoagulation but with corrected coagulation profile.

Case Report

We report a case whereby a 62-year-old female patient developed severe airway obstruction secondary to a blood clot at the tip of a tracheostomy. She had a background history of atrial fibrillation secondary to long-standing untreated mitral stenosis and regurgitation. She was on digoxin for anti-arrhythmia and warfarin for anticoagulation. She presented to the hospital after a week of fever and cough and non-specific headache. She was noted to have right lower lobe pneumonia and her digoxin level and coagulation profile were completely deranged with a digoxin level 2.3 ug/L and her international normalised ratio (INR) at 4. The digoxin and warfarin were stopped and the INR was corrected to 2 with 1 litre of fresh frozen plasma (FFP). Her condition did not improve despite receiving intravenous antibiotic for community acquired pneumonia and was brought to the intensive care for bi-level positive airway pressure (BIPAP) support. The patient was subsequently intubated as her saturation worsened despite BIPAP support of IPAP of 16 cmH₂O and EPAP of 10 cmH₂O. A bedside 2D echocardiography showed severe mitral regurgitation and stenosis with hypertrophic left ventricle. No clot was seen in the chambers or any motion wall abnormality was noted. It also showed dilated bilateral atria with aortic valve sclerosis and severe pulmonary hypertension of 60 mmHg. Ejection fraction was estimated to be around 60%.

A family conference was held and the patient's husband was advised by the intensive care team to have a percutaneous tracheostomy in anticipation of prolonged ventilatory support secondary to her severe deconditioned state. Early tracheostomy was offered in view that she may develop further deconditioning with sedation and may

acquire new infection. In view of her underlining cardiac condition, percutaneous tracheostomy was offered as a safer option and shorter procedure as it did not involve moving the patient to the operating theatre to undergo the procedure under general anaesthesia. Her INR had normalised to 1.1 with another 500 mL of FFP, before the procedure was done.

The percutaneous tracheostomy was done in the presence of 2 consultants with one inserting the bronchoscope through the endotracheal tube and guiding the cannulation of the trachea at the space between the second and third tracheal ring. The Tracoe Percutan Trachy set with size 7 tube was used and inserted after gradual dilation. Minimum bleeding was noted during and after the procedure.

The patient woke up after her sedation and was placed on pressure support mode. Mild oozing was noted at the surgical site and 500 mL of fresh frozen plasma was given after her INR was noted to be at 1.3. Her haemodynamic status and haemoglobin levels were unchanged throughout the night. The next day, a rim of blood clot was noted at the peristomal site and was removed.

There was an obstructed expiratory flow profile on the ventilator though the chest X-ray showed the tip of the tracheostomy 4 cm above the carina and no visible lesion was seen below the tip. The right lower lobe consolidation was still present. There was no expiratory wheeze on auscultation suggesting bronchospasm.

Management

The patient was re-sedated for a bronchoscopy which showed a piece of blood clot at the tip of the tracheostomy. An attempt was made to suck out the clot but the clot dislodged and occluded the entire carina causing a complete absence of air entry. She desaturated rapidly and deteriorated into ventricular fibrillation (VF). External cardiac compression was commenced immediately and intravenous adrenaline was given. She remained unresponsive to ventricular defibrillation and cardiopulmonary resuscitation for about 6 minutes before part of the clot was expelled onto the expiratory fish valve of the resuscitation bag (Fig. 1). Air entry was absent in her left lung but with continuous cardiopulmonary resuscitation, her saturation normalised to 100% and her VF resolved.



Fig 1. Expiratory fish valve.

The patient woke up with minimum neurological deficit and it required another 3 attempts of bronchoscopy over the next few days before the entire blood clot in the left main bronchus was removed completely (Fig. 2). Chest x-ray showed collapse of the left lung (Fig. 3). The patient was subsequently weaned off the ventilator with resolution of her pneumonia and discharged home after spending 3 weeks rehabilitating in the general ward.

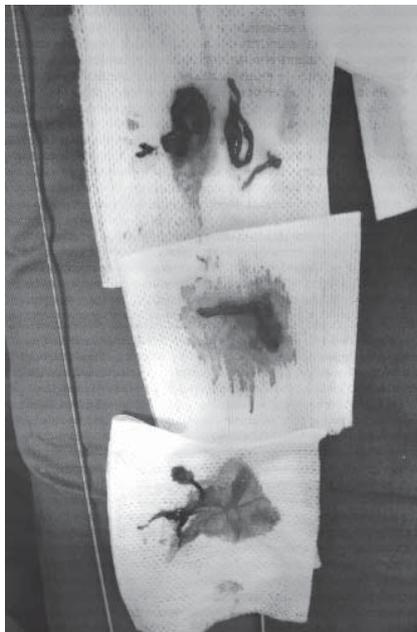


Fig 2. Blood clots were seen.

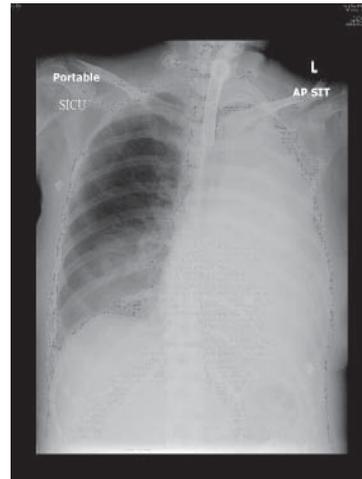


Fig 3. Chest x-ray of the patient.

Discussion

The bleeding at the surgical site was noted to have stopped with infusion of 500 mL of fresh frozen plasma and her INR corrected to 1.0 with minimum haemodynamic changes and a haemoglobin drop of just 0.5 g/dL. The formation of such a big clot at the tip of the tracheostomy was unexpected and the clot was so big that it was not possible to fully determine its size via bronchoscopy. A literature search did not show that a patient previously on warfarin, but with the coagulation profile well corrected was at an additional risk with the percutaneous technique.^{6,7} We suspected that the clot was formed slowly throughout the night and acted as a valve restricting expiration of gases. The combination of external compression and squeezing of the resuscitator bag contributed to restoration of gas flow to the right lung.

The lesson learnt from this encounter is that clot formation is unpredictable and the size of an intra-tracheal clot cannot be easily estimated via bronchoscopy. We must remain vigilant when there is evidence of expiratory or inspiratory flow obstruction on the ventilator monitor. Factors such as ongoing sepsis or excessive fluid infusion can continuously contribute to coagulopathy even if there is laboratory evidence of correction.

Careful consideration of the risks and benefits must be taken into account before offering percutaneous tracheostomy to patients with coagulopathy and ongoing sepsis. Open tracheostomy with better control of the bleeding points may be a better option for such patients. One must review the peristomal site regularly to look for bleeding regardless of the method of tracheostomy and not hesitate for a relook bronchoscopy if there is any doubt.

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