Supplemental Digital Content

Contents:

eTable 1: Table showing manifestations of barotrauma, radiological window and relevant invasive procedures for patients in the barotrauma group

Patient	Radiological window, days of admission	Relevant procedures	Clinical features	Management
1	1 - 2	Nil	1, 2, 3L+R	Bilateral chest drain insertion
2	8 - 9	Day 8 NG tube (removed as coiled in neck); day 9 NG tube and intubation	1, 2	Conservative
3	6 - 8	Day 8 NG tube, right internal jugular central venous catheter, and intubation	1, 2, 3L	Chest drain insertion
4	8 - 20	Nil	1, 2	Conservative
5	4 - 5	Nil	1, 3R	Conservative
6	4 - 6	Day 4 NG tube, right internal jugular central venous catheter, and intubation	1, 2	Conservative
7	5 - 6	Day 5 NG tube, right internal jugular central venous catheter, and intubation	1, 2	Conservative
8	5 - 8	Nil	1, 2, 3L+R	Conservative

First day of the radiological window is defined by the latest chest radiograph with no evidence of barotrauma prior to its first being identified. NG tube=nasogastric tube. CVC=central venous catheter. For clinical features: 1=subcutaneous emphysema, 2=pneumomediastinum, 3(L±R)=pneumothorax (left and/or right-sided).

eTable 2: Table showing baseline characteristics, medical history and symptoms of patients in the barotrauma group

Patient	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Age at presentation, years	56	60	31	63	53	38	55	34
Sex	M	M	M	M	M	M	M	M
Past medical history	Hypertension, type 2 diabetes mellitus	Benign prostatic hypertrophy	X-linked agammaglobulinaemia, bronchiectasis	Chronic lymphocytic leukaemia, hypogammaglobulinaemia, immune thrombocytopaenic purpura	Hypertension, intracranial haemorrhage	Nil	Hypertension, type 2 diabetes mellitus	Hypertension, latent tuberculosis
Smoking history	Ex-smoker	Non smoker	Non smoker	Non smoker	Non smoker	Ex-smoker	Non smoker	Non smoker
Symptoms	Fever, shortness of breath, cough, rigors	Fever, shortness of breath, cough, vomiting	Fever, shortness of breath, cough, fatigue	Fever, shortness of breath, cough, urinary frequency	Fever, shortness of breath, cough	Fever, shortness of breath, cough, myalgia	Poor oral intake, confusion	Fever, shortness of breath, cough, myalgia, sore throat
Duration of illness prior to hospital admission, days	7	14	21	3	5	13	5	8

eText 1: Clinical summaries for the patients who in the barotrauma group

Patient 1:

Patient 1 was transferred to the critical care department for CPAP on day 1 of his admission. On day 3, he developed neck pain, swelling and tenderness. A chest radiograph showed subcutaneous emphysema, pneumomediastinum and small bilateral apical pneumothoraces.

On day 4, he developed chest pain with associated dynamic inferior ST-elevation, and was transferred to a tertiary percutaneous coronary intervention centre. He was intubated and proceeded to the cardiac catheterisation laboratory. Angiography showed 75% occlusion of the distal right coronary artery secondary to a large thrombus. This was treated with thrombectomy and placement of a drug-eluting stent.

On day 7, his serum ferritin measured 42,814 µg/L (normal range 30 – 400), ALT 2583 IU/L (5 – 55), and triglycerides 3·5 mmol/L (0·5 – 2·0). Clinically, he was noted to have splenomegaly. His H score was calculated to be 169, suggesting secondary haemophagocytic lymphohistiocytosis, and he was treated with tocilizumab (8mg/kg). Bone marrow aspirate subsequently showed no definitive features of haemophagocytosis.

On day 9, a CT pulmonary angiogram identified segmental and subsegmental pulmonary emboli.

On day 18, a CT thorax (Figure 2) showed extensive subcutaneous emphysema and pneumomediastinum, and resolution of pneumothoraces. By day 30, a repeat scan showed resolution of the subcutaneous emphysema and pneumomediastinum.

At final follow-up, he remained as a critical care inpatient and was undergoing tracheostomy weaning.

Patient 2:

Patient 2 was admitted to the critical care department for CPAP on day 1 of his admission, but was intubated later that day due to persistently high work of breathing. He was extubated onto CPAP on day 5, but required re-intubation on day 9 due to a combination of agitation and respiratory distress. A chest radiograph performed post re-intubation showed subcutaneous emphysema and pneumomediastinum, not present on a chest radiograph one day earlier.

On day 17, sputum culture grew AmpC beta-lactamase-producing *Klebsiella aerogenes* (sensitive to gentamicin, meropenem, and temocillin). On day 22, CT thorax showed right-sided cavitating pneumonia (eFigure 1, Supplemental Digital Content), and resolution of subcutaneous emphysema and pneumomediastinum. He was reviewed a respiratory physician, who advised against chest drain insertion.

Despite ongoing mechanical ventilation via tracheostomy, he died on day 34.

Patient 3:

Patient 3 was admitted to the critical care department for CPAP on day 5 of his admission. On day 8, he deteriorated acutely and required intubation. A post-intubation chest radiograph demonstrated left-sided pneumothorax and subcutaneous emphysema. A left-sided chest drain was inserted. On day 9, a CT pulmonary angiogram additionally demonstrated pneumomediastinum and a possible segmental pulmonary embolism (eFigure

2, Supplemental Digital Content). Due to progressive respiratory failure, he was transferred to a tertiary centre for extra-corporeal membrane oxygenation (ECMO).

He was decannulated from ECMO on day 26. His tracheostomy was removed on day 52, and he was discharged on day 81.

Patient 4:

Patient 4 was admitted to the critical care department for NIV on day 10 of his admission, after rapidly deteriorating on the ward. D-dimer was noted to be 29,663 ng/mL (0-230), and he was treated presumptively with treatment dose enoxaparin. He gradually improved, and was changed first to CPAP on day 13, and then to facemask oxygen on day 18. A CT pulmonary angiogram performed on day 20 confirmed bilateral pulmonary emboli, as well as incidentally identifying subcutaneous emphysema and pneumomediastinum (eFigure 3, Supplemental Digital Content). Given his sustained clinical improvement over the preceding days, barotrauma is likely to have been an incidental finding that had occurred earlier in his admission.

He was discharged home with oxygen therapy on day 35, which was subsequently discontinued.

Patient 5:

Patient 5 was admitted to the critical care department for CPAP on day 4 of his admission, but was later changed to NIV to assist with his work of breathing. A chest radiograph on day 5 demonstrated subcutaneous emphysema and a possible small right-sided apical pneumothorax. He was intubated later that day. On day 6, he was started on treatment dose enoxaparin (D-dimer 12,514 ng/mL (0 – 230)). Whilst mechanically ventilated, the subcutaneous emphysema substantially improved, and the pneumothorax spontaneously resolved. Despite proning and paralysis, he developed progressive respiratory failure and died on day 13.

Patient 6:

Patient 6 was admitted to the critical care department for CPAP on day 3 of his admission, but required intubation on day 4 due to respiratory distress. On day 5, chest and facial swelling was noted clinically, and a CT thorax and head confirmed pneumomediastinum with extensive subcutaneous emphysema extending to the face and left orbit. Despite proning and paralysis, his oxygen requirement increased and he was therefore transferred to a tertiary centre for ECMO. He died on day 26.

Patient 7:

Patient 7 was transferred to the critical care department for CPAP on day 3 of his admission, but was intubated on day 5 due to respiratory distress. On day 6, anterior chest wall swelling was noted, and subcutaneous emphysema and pneumomediastinum were confirmed on chest radiograph. He developed progressive respiratory and renal failure, and died on day 11.

Patient 8:

Patient 8 was intubated in the Emergency Department, and admitted to the critical care department. On day 4, he was transferred to another hospital for capacity reasons. Subcutaneous emphysema was noted clinically on day 8, and a CT scan confirmed pneumomediastinum. He developed progressive respiratory and renal failure, and died on day 20.