

Philip Leadbeater^{1,2}, Nicole Tribe^{1,2}, Jonathon Dean^{1,2}, Ben Singer^{1,2}
and Mamoun Abu-Habsa^{1,2}
1. North East London Critical Care Transfer and Retrieval
2. Bart's Health NHS Trust

Background

- The North East London Critical Care Transfer and Retrieval service (NECCTAR) operates a duty team of Registrar, Nurse/ODP and two ambulance service personnel (mixed roles) with oversight by a duty Consultant
- We employ rigorous clinical governance to evaluate individual clinical care and organisational processes
- This includes individual case analysis; critical incident reporting and review; and patient follow up to the point of critical care discharge

We present a case complicated by a post transfer critical incident and describe the measures taken to translate our learning to service development

Case review

A 61 year old female with severe COVID-19 developed an ischaemic lower limb necessitating critical care transfer to the regional vascular centre. A referral was made to our service at 1930 hours.

- day 13 COVID symptoms
- day 8 CPAP therapy, FiO₂ 0.7 (in critical care)
- acute left femoral artery thrombosis with cold, pale and pulseless left lower limb
- PMH: hypertension, type 2 diabetes mellitus, mild asthma, obesity

Transfer process

- The referring and transferring teams agreed on emergent intubation prior to transfer
- After intubation there was low lung compliance and a poor alveolar-arterial oxygen gradient
- Transferring from bed to trolley there was a drop in tidal volume, oxygen saturation and an increase in end-tidal carbon dioxide
- After examination, this was attributed to supine vs head-up positioning and known severe respiratory disease

	Pre-departure	Arrival
FiO ₂	1.0	1.0
pH	7.20	7.20
PaCO ₂ (kPa)	8.65	8.96
PaO ₂ (kPa)	9.87	10.7
Haemoglobin (g/L)	127	122
Base excess (mmol/L)	-3.7	-2.9
Lactate (mmol/L)	4.4	3.6
Peak pressure (cm H ₂ O)	32	32
PEEP (cm H ₂ O)	10	8
Tidal volume (ml)	330	400
end-tidal CO ₂ (kPa)	6.5	4.9

Table 1. Arterial gases and ventilatory indices pre- and post-transfer

- A decision was made to proceed with emergency transfer without chest x-ray due to limb threatening ischaemia
- Oxygenation and ventilation slowly improved prior to and during transfer
- Handover to receiving unit: 2130-2150

Conclusions

Patient follow-up and close-working with stakeholders in our service allows us to identify and analyse critical incidents related to transfer

This has led to mechanisms that can prevent recurrence and identified ways to develop our clinical capability

Critical incident

Rapid deterioration approximately 2330:
-subcutaneous emphysema over the neck and thorax
-rapid desaturation and high ventilation pressures

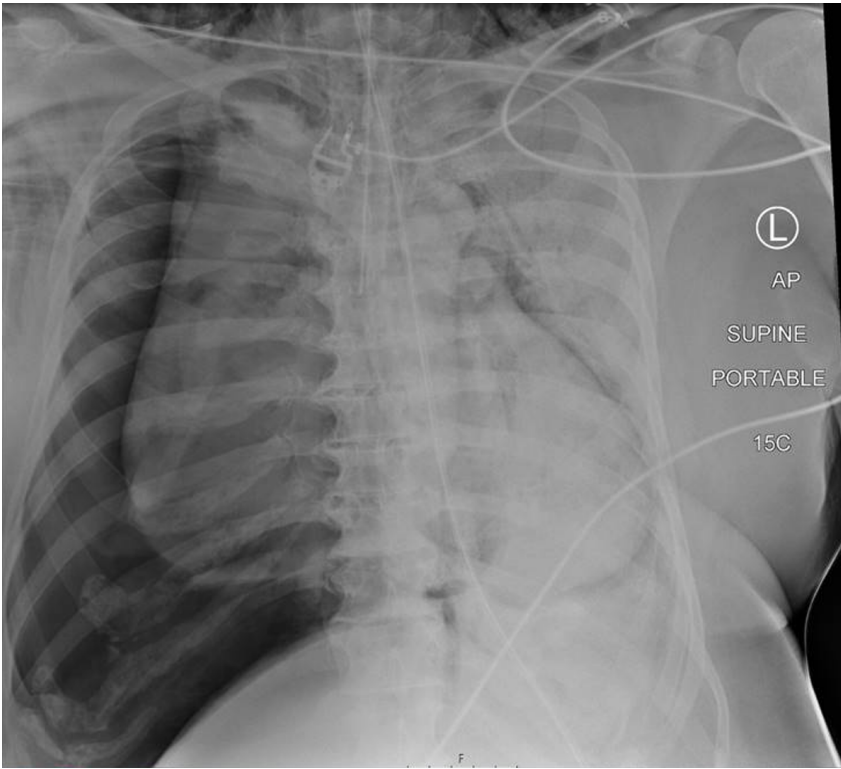


Figure 1. Chest radiograph (ordered prior to deterioration and completed simultaneous to drain insertion) showing right pneumothorax, displaced mediastinum and subcutaneous emphysema

A clinically suspected right tension pneumothorax (figure 1) was managed with decompression and intercostal drain. Onset of pneumothorax is unknown.

- Vascular intervention was delayed until the following morning - distal perfusion restored
- Delay not felt to have compromised limb
- ICU stay 45 days, total hospital stay 85 days
- Discharged home

A multi-disciplinary morbidity meeting took place with input from the receiving critical care, vascular surgery and our service

Learning and development

We identified missed opportunities for the potential detection of a pneumothorax

- Post-intubation imaging prior to transfer
- Ensuring post-intubation imaging was arranged / completed at handover to the receiving unit

Contributing factors:

- Intubation immediately prior to transfer is a rare event for our service
- Perceived urgency of a ‘time-critical’ transfer
- Confirmation bias of anticipated clinical course
- Staffing pressures at referring site

How can we prevent recurrence?

- Clinical governance day discussion
- Introduction of a service-specific RSI guideline and cognitive aid including post-intubation chest x-ray

What further measures can aid evaluation of respiratory deterioration?

Lung point of care ultrasound (POCUS) is an established tool^{1,2}

We are developing a service-specific governance structure for the use of lung POCUS as a diagnostic (‘rule-in’) aid

- A compact device with image storage
- Operators credentialed within existing schemes
- Oversight by experienced POCUS supervisors