Vascular air embolism

Please note all images are licensed, used by permission of the copyright owner and cannot be used for any other purpose
Introduction

• What is a vascular air embolism?
• Recent NSW experience
• Prevention strategies

A vascular air embolism (VAE) is when air enters the vascular system and produces systemic effects.
Direct communication between atmosphere & circulation

Pressure in vessels < atmosphere
Which devices?

Images from CVAD fundamentals package & used with permission from HETI
Signs & Symptoms

Small < 0.5 ml/kg
- Altered mental status
- Dyspnoea
- Wheezing
  - \( \downarrow \text{SpO}_2 \)

Medium 0.5-2ml/kg
- RR
- HR
- BP
- ECG changes

Large > 2ml/kg
- Chest pain
- Acute right heart failure
  - \( \downarrow \text{LOC} \)
- Cardiac arrest

Activate emergency team based on the patient condition
NSW Incidents Jan 2012-Apr 2015

• 14 events
• 9 incidents in critical care
• 6 deaths
• 9 during removal procedures
  – 7 semi-recumbent position

Prevention – INSERTION

Assess & Plan
- Most appropriate device
- Assess patient risks & plan

Position
- Supine or trendelenberg in bed

Prepare
- Priming, clamping & apply valves to each lumen
- Secure at 2 sites

Monitor
- Monitor patient
<table>
<thead>
<tr>
<th>Prevention – LINE MAINTENANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assessment</strong></td>
</tr>
<tr>
<td>• CVAD still needed?</td>
</tr>
<tr>
<td>• Check connections each shift</td>
</tr>
<tr>
<td>• Document length of catheter outside vessel</td>
</tr>
<tr>
<td><strong>Admin sets</strong></td>
</tr>
<tr>
<td>• Minimise connectors</td>
</tr>
<tr>
<td>• Valves on each lumen with luer locks</td>
</tr>
<tr>
<td>• Clamps ON when disconnecting</td>
</tr>
<tr>
<td><strong>IV pumps</strong></td>
</tr>
<tr>
<td>• Use ‘air in line’ alarms</td>
</tr>
</tbody>
</table>
Prevention – REMOVAL

Assess & Plan
- Assess patient risks
- Seek advice if pt unable to lie flat or has high RR
- Plan & explain the procedure

Position
- Supine or trendelenberg in bed

Removal
- End inspiration & apply pressure to site until haemostasis
- Apply occlusive dressing for 48 hours

Monitor
- Check obs in the immediate post removal period
- Do not transfer patients within 30 minutes
CVAD needed
Assess & plan
Connections
Monitor
Role model
## CVAD Training Information

<table>
<thead>
<tr>
<th>HETI code</th>
<th>Name of course</th>
</tr>
</thead>
<tbody>
<tr>
<td>92712530</td>
<td>Central Venous Access Devices: the Fundamentals – e learning module</td>
</tr>
<tr>
<td>92382298</td>
<td>CVAD Intravenous (IV) Administration Set Change Assessment Tool</td>
</tr>
<tr>
<td>92381360</td>
<td>CVAD Dressing and Swabable Capless Valve (SCV) Change Assessment Tool</td>
</tr>
<tr>
<td>92382007</td>
<td>CVAD Removal of Non- Tunnelled Assessment Tool</td>
</tr>
<tr>
<td>96342016</td>
<td>Vascular Air Embolism PODCAST (link out)</td>
</tr>
<tr>
<td>N/A</td>
<td>Central Line Insertion</td>
</tr>
</tbody>
</table>
NSW Health

Further reading


Case Studies

• Vascular air embolism
  http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3665124/

• A Patient With Acute COPD Exacerbation and Shock
Contacts

Clinical Excellence Commission
Margherita Murgo and Vicki Fox
Patient Safety Project Officer and Data Analyst
margherita.murgo@health.nsw.gov.au, vicki.fox@health.nsw.gov.au

Agency for Clinical Innovation
Kaye Rolls
Clinical Project Officer
kaye.rolls@health.nsw.gov.au

Please note all images are licensed, used by permission of the copyright owner and cannot be used for any other purpose