



PATIENT SAFETY UPDATE

1 October 2022 – 31 December 2022



LEARNING POINTS FROM REPORTED INCIDENTS

Blue dye and anaphylaxis

In response to communication from a member of the public, we would like to remind readers of a previous NHS alert and direct communication to health professionals about the risk of anaphylaxis from blue dyes used in marking sentinel nodes in breast surgery and in particular, Patent Blue V.¹ When anaphylaxis happens, anaesthetists are often called upon to recognise it and lead treatment and so it is important we remain vigilant and aware of important trigger. The alert recommends that facilities for treatment of anaphylaxis are available for at least one hour after administration. In NAP6, anaphylaxis to Patent Blue had the second highest incidence, after teicoplanin of all drugs and was above suxamethonium and all NMBAs. Symptoms were often delayed after administration compared to other drugs.² Anaesthetists will be familiar with the anaphylaxis treatment page in the Quick Reference Handbook.³ In addition, Resuscitation Council UK is shortly to issue its own stand-alone guidance covering treatment of anaphylaxis in the perioperative period.

1. [Blue Dyes: Risk of Serious Allergic Reactions](#), MHRA, 2014.
2. Farooq, S. [Chapter 18: Patent Blue Dye. Anaesthesia, Surgery and Life-threatening Allergic Reactions: Report of the Royal College of Anaesthetists' 6th National Audit Project: Perioperative Anaphylaxis](#). RCoA, London. 2018.
3. [Quick Reference Handbook](#), Association of Anaesthetists, 2022.

The rest of the cases are incidents reported between 1 October 2022 and 31 December 2022, reported to the NRLS by 28 December 2022

Bleeding in the airway

"The patient had a cardiac arrest due to airway obstruction because of airway bleeding the night before. After handover the thoracic surgeons were asked to assess patient and perform a bronchoscopy... It was thought that the source of bleeding was above the tip of the tube as clot was seen tracking down beside the tube. On inspection of the oral cavity it was occupied with clot that kept reaccumulating. ENT were asked to attend. Further inspection of the trachea did not allow the existing clots to be cleared. [Another surgeon] suggested a rigid bronchoscopy but because of fear of losing the airway to upper airway bleeding at this time, this was deferred until ENT arrival and inspection. The ETT tube was advanced as distal as possible to prevent any further clot migration into the lumen but ultimately ventilation was only possible with suction catheter down the ETT beyond the tip. A decision was made to do the rigid bronchoscopy to clear the clots and this was successfully performed with jet ventilation. A partial tear to the back wall of the trachea was found. The patient was reintubated and on ENT inspection a tear to the soft palate and the pharynx were identified. The patient was kept asleep, paralysed with good gas exchange."

Blood clot in the airway can be very difficult to remove because of its adherence; using the suction on a flexible bronchoscope may not be sufficient. Although the mechanism of injury is not specified in this story, it seems likely that separate injuries to the soft palate and trachea were caused at laryngoscopy and intubation of the trachea. In any event, this story is a reminder of the hazards that exist. Intubation is not a benign procedure. Airway bleeding should always be investigated. Endoscopy is universally available and should not be delayed. If the source of the bleeding cannot be easily identified then evaluation of the airway without the tracheal tube should be considered. This requires careful planning, as in this case, but again, this should not be delayed if bleeding is significant.

Lidocaine overdose

"Lignocaine overdose causing toxicity and multiple VF arrests."

This story serves as a sentinel example of how not to write a critical incident report. It is not stated whether the 'overdose' of lignocaine was prescribed and given in a wrong dose or was the right dose given too quickly or whether it was given accidentally. The patient outcome similarly is not reported. Thus, very little learning follows, but it gives a useful opportunity to remind readers that it is a stipulation of the College's Guidelines for the Provision of Anaesthesia Services¹ that "All local anaesthetic solutions should be stored in a separate storage unit from intravenous infusion solutions, to reduce the risk of accidental intravenous administration of such medication" (Chapter 2, point 7.41). Treatment of LA toxicity is detailed in the Association's QRH² or individually on the Association website.³

1. [Chapter 2: Guidelines for the Provision of Anaesthesia Services for Perioperative Care of Elective and Urgent Care Patients](#), RCoA, 2023.
2. [Quick Reference Handbook](#), Association of Anaesthetists, 2022.
3. [Management of Severe Local Anaesthetic Toxicity](#), Association of Anaesthetists, 2010.

Complication of thyroid surgery

"... elective total thyroidectomy and left neck dissection. Post-op period complicated by stridor on extubation. Re-intubated and returned to theatre for left vocal cordotomy, ligation of leaking chyle duct, repair of left common carotid bleeding. On extubation in theatre again developed stridor so underwent tracheostomy. Developed pneumothorax with subsequent extensive surgical emphysema to chest wall, neck and face."

Head and neck surgery is by its nature often high risk. All of those involved should be familiar with and ready to deal with airway obstruction and airway or neck bleeding. Likely complications should be anticipated, actively checked for and managed promptly. When problems occur, there should be joint assessment by anaesthetist and surgeon and, when necessary, early re-intubation to protect the airway. In

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this case, the patient and team unfortunately seem to have encountered the full gamut of complications possible.

Problem after ITU step down

"Patient received from ITU, appeared very poorly on admission. It was mentioned that patient was scoring 2 on handover but when we checked obs was scoring 10 and neuro obs 6. Blood sugar level monitored 6.8 mmol recorded, insulin given. Patient's body appeared very oedematous on assessment - unable to move all limbs. Patient was on 15 litres humidified oxygen, NG Tube was also in situ, NBM for NG feeding. Tried to aspirate to start the feeding but no aspirate obtained, hence night meds not given. IV ABX administered. I find this patient consuming most of my time, compromising other patients' care as I had ten patients to look after."

There is a lack of detail here, but it does serve as a reminder that transition of care should be a planned procedure, occurring in hours with good communications between the parent and destination medical and nursing teams, ensuring sufficient resource is in place at the destination. Even with good planning, patients can deteriorate after step down and may need reassessment by the critical care team and readmission.

Issues with IV line

Case 1: *"Cardiac arrest leading to ECPR. Called from break to a very hypotensive child - report that child had had some desats. Saline and suction was done and had finished when child became hypotensive. APLS started with defib attached - paced not a shockable rhythm. ECLS call out and surgeon to open chest. Drugs initially given via RIJ and at some point I asked for a 200cm line to be attached to make it easier with chest opening. It became apparent after a period of time the low glucose was not rising and the heparin had little effect. I said out loud that this is unusual and this prompted the drugs nurse to look at the line. She clearly identified there may be a problem. I asked them to stop using the 200cm line and give drugs direct into the RIJ. When finished and drapes remove, 200cm line in bed and all lumens with bungs or infusions. The child was on 0.3 adrenaline throughout. The child missed receiving bicarb calcium fluid blood due to this."*

Case 2: *"Alerted by emergency buzzer to cubicle. On attendance patient under-going CPR (shortly after ROSC therefore discontinued). Nurse explained that syringe driver containing norad had alerted her that the line was occluded and then the patient instantaneously lost BP then output. Medic attended immediately and administered noradrenaline whilst awaiting defib, immediate significant improvement of BP. On further investigation it was found that the norad had been running on the purple line of the Kimel line (previously known to have had issues with occlusions with other patients)"*

Case 3: *"Whilst procedure being carried out, Vascular consultant noticed that patient's right arm was swollen on further examination it looked as if the cannula had tissue and arm looked mottled and oedematous."*

These cases highlight the need for vigilance with all lines. The reporters in case 2 imply a recurring problem, but do not say whether they reported it to the MHRA; this would be the correct thing to do, at yellowcard.mhra.gov.uk.

Hazards of proning

"Upon skin inspection, tip of nose has SDTI [suspected deep tissue injury], upper lip has SDTI, inner lip has grade 2 due to ET tube and prone for 16 hrs"

The Intensive Care Society has guidance on this topic.¹ It is nonetheless important to share stories such as this to keep the risks at the forefront of clinicians' minds.

1. [Prone Position in Adult Critical Care](#), ICS, 2019.

Myelinolysis secondary to sodium correction

"[Infant] with background of gastroschisis and ileostomy in situ. Under follow-up with gastroenterology [tertiary], paediatric surgeons [tertiary] and general paediatrics [at local hospital]. Previously receiving sodium supplements. Presented to ED with vomiting, loose stool, lethargy and weight loss. Na+ (sodium level) 97 on gas in ED. Sodium correction started in ED and patient moved to CICU for ongoing management. Sodium corrected over the next 48hrs. 48hrs later was found to have altered neurological status with irritability, lethargy and weakness. MRI subsequently showed oedema of the basal ganglia and extrapontine myelinolysis, consistent with being secondary to fluid and electrolyte shifts. Minimal improvement in neurological status at this point in time (further 48hrs later)."

We have seen several reports of this in PSU of late. The balance is between correcting the sodium level quickly enough initially to prevent or terminate seizures and then correcting the remaining deficit slowly to avoid this syndrome of myelinolysis. It has been the subject of a recent NEJM editorial.¹

1. Ayus, JC; Moritz, ML. [Editorial: Hyponatremia Treatment Guidelines- Have They Gone Too Far?](#) NEJM Evid, 2023; **2(4)** (NB: paywall).

Central venous line

"Patient became unwell on mobilisation with cardiorespiratory compromise and reduced level of consciousness. Noted one lumen on the right internal jugular central catheter was leaking following return of patient to supine position in bed. Subsequent transoesophageal echocardiography has demonstrated gas present in both right and left sides of the heart with a patent foreman ovale."

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Air entrainment seems to be the likely cause of harm here.

Air embolism can occur when there is a route for air into the circulation, and the circulatory pressure is lower than atmospheric pressure at the point of entry. Arterial air emboli are usually associated with endovascular procedures where air inadvertently gets into an arterial line. Venous air emboli most commonly seen with head and neck surgery, neurosurgery, endovascular procedures and with central lines in the internal jugular vein. Air embolism can occur at the point of line insertion or removal, or if there is a problem with the connections that allows air to be entrained. Air embolism can lead to rapid cardiac arrest, which can be difficult to treat.

The lessons from this report remind us to check central line connections regularly, and particularly when mobilising a patient (where the central venous pressure will drop). If a venous embolism is recognised or suspected, the priority is to stop further entrainment of air by raising the venous pressure and covering the site of entry. In surgical cases this can be achieved by flooding the area with sterile saline. Standard resuscitation measures should commence, and the patient can also be placed in the Trendelenburg (head down) position. Durant's manoeuvre involves additionally placing the patient on their left side to encourage any 'air lock' in the right ventricle to migrate to the right atrium. If the patient has a central line in situ, attempted aspiration may help to remove air from the right side of the heart.

Removal of central lines is another high-risk period and should be undertaken with the patient supine or head down to ensure that the venous pressure at the neck is relatively high.

This phenomenon (not this case) has been the subject of a coroner's Report to Prevent Future Deaths.¹ The Association's Quick Reference Handbook has a specific page devoted to treating circulatory embolus (including air) during anaesthesia² and McCarthy and colleagues have written a useful open access review of the topic.³

1. [Prevention of Future Deaths Report: Richard Kew, Coroner's Court, 49, Feb 2023](#)
2. [Quick Reference Handbook](#), Association of Anaesthetists, 2022
3. McCarthy, C; Behraves, S; et al. [Air Embolism: Practical Tips for Prevention and Treatment](#). *J Clin Med*. 2016 5(11), 93.

Tracheostomy

Case 1: "Patient was admitted to intensive care after laparotomy for small bowel obstruction and ischemia. Tracheostomy done to help with weaning and was on trachy mask 28% oxygen. Attempted above cuff vocalisation... Sudden development of surgical emphysema and cardiac arrest. Died despite CPR attempts."

Case 2: "The patient had a surgical tracheostomy inserted... It leaked air past the cuff into the patient's mouth and required high cuff pressures. [Two weeks later] the patient was taken to theatre for a change of tracheostomy and was found to have a large tracheo-oesophageal fistula."

Cuff pressures on tracheal or tracheostomy tubes should be checked regularly and kept as low as possible. For patients receiving invasive ventilation, the cuff pressure needs to be at or above the inspiratory pressure to maintain a seal. Pressures above 30 cm H₂O can affect tracheal mucosal blood flow, which can lead to pressure necrosis and fistulae.

If a patient develops a 'cuff leak' then this might imply that the tracheostomy tube is malpositioned within the trachea. An endoscopic evaluation of the tube is recommended. This might result in a tube change, usually for a larger or longer tube. Changing a relatively new tracheostomy tube can be difficult and a thorough assessment of the tube position after initial insertion is recommended. Leaving the (partially withdrawn) tracheal tube in place after the tracheostomy has been performed allows an easy route to assess tube position from above. The position of the tube can change between the hyperextended insertion position and the 30-degree sat up nursing position that an ICU patient will spend most of their time in. Re-positioning the patient after insertion before checking endoscopically adds some time to the insertion procedure but will allow any problems with the tube position to be identified when all of the people required to change the tube are available.

The take home messages from this report are to consider cuff leaks in the context of the ventilator pressures, to check the position of the tracheostomy tube meticulously at the time of insertion and if a cuff leak is identified, and to act promptly when a cuff leak is identified. Simply hyper-inflating the cuff might make the problem appear to go away, but this is likely going to cause new problems related to mucosal ischaemia.

McGrath and colleagues have written a useful open access guide to ways of assessing tracheostomy position.¹

1. McGrath, BA; Lynch, K; et al. [Assessment of Scoring Systems to Describe The Position Of Tracheostomy Tubes Within The Airway – The Lunar Study](#). *BJA*, 2017. **118**(1): 132-138.

Hip fracture surgery

Case 1: "During performance of spinal anaesthetic under sedation patient became bradycardic with no palpable pulse. DNACPR was in place and current. Discussion with Dr [PERSON 1]: usual practice to give sedation to the patient and position them for the spinal anaesthetic with the fractured hip on the lower side. After the sedation had been given and patient positioned for the procedure, the patient developed a bradycardia. Given the frailty of the patient

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and the pre existing DNACPR order, the team decided not to proceed with the anaesthetic and surgery. The patient's next of kin was informed of the events and the decision not to proceed."

Case 2: "Patient undergoing (cemented) distal femoral replacement for periprosthetic distal femoral fracture. Procedure performed under GA with invasive arterial pressure monitoring, cell salvage and metaraminol infusion. Relatively stable intra-op but when tourniquet deflated at end of procedure (prior to surgeons closing) patient developed progressive hypotension which was not responsive to fluid bolus, metaraminol or ephedrine and progressed to PEA cardiac arrest."

The regular reminder of the frailty of hip fracture patients. It is usual to suspend advance care plans in the peri-operative period and to treat deteriorations that are directly related to our intervention and are reversible. Even if an advance care plan was in place, treating the bradycardia would not have been ruled out by its existence. It is not clear whether the patient's bradycardia was treated. Tourniquet use is implied in case 2, potentially for an extended period. Release of tourniquet with subsequent systemic release of potassium could have been an indication to try calcium administration during this cardiac arrest.

1. [Implementing Advance Care Plans In The Perioperative Period Including Plans For Cardiopulmonary Resuscitation](#), Association of Anaesthetists, 2022.

Difficulty with major haemorrhage protocol

"... difficulty in obtaining blood quickly in major haemorrhage prior to start of case contacted blood bank to cross match 2 units - made aware would be 1 hour. At this time asked if type specific would be available if needed sooner. Surgery not started until after siting of Arterial line, GA, central line and urinary catheter. On opening bleeding noted unable to get through to blood bank engaged. Major haemorrhage call put out via 2222. Still difficulty contacting blood bank. major haemorrhage pack ordered. Further blood and products requested as needed. Multiple rounds CPR with less than 2 min ROSC in between whilst waiting for blood"

This vignette serves as a useful reminder that any protocol is only as good as the systems that underpin it. Direct and clear communication with haematology laboratory staff and 'if necessary' medical staff is important. Regular stress testing of protocol activation can help identify problems.

Sedation

"... listed for cystogastrostomy due to parapancreatic cyst under general anaesthetic/anaesthetic led sedation. Previous attempt under gastroenterologist sedation abandoned due to tachypnoea. Patient and family (mother and partner) informed prior to procedure about planned conduct of anaesthesia. Plan A anaesthetic led sedation and if not tolerating or complicated procedure plan B general anaesthetic. Patient supine and sedated with propofol infusion and fentanyl. Oxygenation maintained with high flow nasal oxygen with end tidal CO2 monitoring and BIS. Endoscope inserted by gastroenterologist and hot axios (cystogastrostomy) performed. At that time cystic fluid started draining into the stomach, suctioned by gastro team via endoscope. Once rate of fluid drainage had reduced and suctioned, endoscope removed in order to facilitate placement of further drain. At that point cystic fluid noted to be continuously coming out of pharynx. High suspicion of aspiration into lungs."

Standards of monitoring during sedation are covered in the Association's recent guideline¹ and in this case, it appears that they were adhered to. There is a finite risk of regurgitation and aspiration with this type of procedure, and it is important that the joint plan includes means of detecting this and dealing with it. There should also be a reasoned decision about what level of airway protection is indicated. Supraglottic airway devices are available for use during this type of procedure.^{2,3} Depending on the assessed level of risk, tracheal intubation may be indicated.

1. [Standards of Monitoring During Anaesthesia and Recovery](#), Association of Anaesthetists, 2021.
2. [LMA Gastro Airway Datasheet](#), Teleflex Incorporated, 2018.
3. [VBM Gastro-laryngeal Tube G-LT Datasheet](#), VBM Medizintechnik GmbH.

