

Patient Safety Update: gastric aspiration, access to care, corneal abrasions

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QUESTIONS

Before continuing, try to answer the following questions. The answers can be found at the end of the article, together with an explanation. **Please answer True or False:**

1. Regarding pulmonary aspiration of gastric contents:

- Aspiration most commonly occurs at induction
- Aspiration is the most common cause of airway management-related death in the UK
- Cricoid force reliably reduces the likelihood of aspiration at induction
- Antibiotics should be given once a diagnosis of aspiration has been made
- Extubation awake, in the upright position, is recommended where there is a risk of aspiration

2. Regarding emergency surgery:

- The timing of antibiotics has no effect on outcome in septic patients
- Postoperative ICU should be considered for patients with an estimated mortality risk $\geq 10\%$
- Outcomes after surgery are worse for patients booked as an emergency compared to elective daytime surgery
- The consultant surgeon and anaesthetist should be informed only when the mortality risk is high i.e. $\geq 10\%$
- Emergency surgery is not suitable for training

3. Regarding eye injuries sustained during anaesthesia care:

- Eye injuries are the most common cause for litigation against anaesthetists
- Injuries to the eye occur in around 1 in 100 anaesthetics
- General anaesthesia has no effect on tear production
- Corneal abrasions can be produced without mechanical trauma
- Incomplete lid closure affects fewer than one in ten patients

Key Points

- Aspiration accounts for more deaths than a failure to intubate or ventilate
- Local policies for access to theatres need to make sure emergency surgery can take place with appropriate urgency and support
- Corneal abrasions can occur in sedated as well as anaesthetised patients

INTRODUCTION

This tutorial is based on the Patient Safety Update published by the Safe Anaesthesia Liaison Group (SALG). SALG is a professional group with a core membership including representatives from the Royal College of Anaesthetists (RCoA), the Association of Anaesthetists of Great Britain and Ireland (AAGBI), and NHS England Patient Safety. SALG's quarterly Patient Safety Updates contain learning from incidents reported to the National Health Service England and Wales National Reporting and Learning System (NRLS). The aim of SALG is to highlight potential or existing patient safety issues from patient stories, and to encourage incident reporting for the purpose of learning.

Cases reported to the NRLS database that are associated with severe harm or death are reviewed on a quarterly basis and form the basis of the SALG PSU. The text is changed very little from the reports of the clinicians involved – these are real stories. There are often common themes within the cases that influence the learning points highlighted. The aim of this exercise is to learn from the experience of others, and in that way we can all improve the care of our patients.

The cases reported are reproduced with permission from The Safe Anaesthesia Liaison Group, and were originally published on the Royal College of Anaesthetists and the Association of Anaesthetists of Great Britain and Ireland websites. Further information, together with this and previous Patient Safety Updates, is available on the SALG website¹. The information contained in this tutorial is taken from the SALG Patient Safety Update Oct-Dec 15 but SALG has not reviewed this publication.

ASPIRATION OF GASTRIC CONTENTS

"I saw the patient on the morning of the operation. He had been cancelled due to profuse diarrhoea on the operating table on the Friday, since then he said he had been well, with no further episodes of diarrhoea. I also asked him about vomiting and he stated he had a phlegmy cough. He may have vomited the evening before but not since and felt well. In theatre the patient had a GA with LMA then spinal, with no problems with spontaneous breathing on LMA. He was transferred to the operating table and placed in the lateral position and prepared for surgery. Just after knife to skin the patient started to move, and I noted large amounts of coffee grounds in the LMA...The LMA was removed and the airway suctioned +++. Large amounts of coffee ground fluid came out...patient become very distressed and hypoxic, and was intubated, and ventilated, ETT sucked out and coffee grounds vomit found....Patient was transferred to ITU (at the end of surgery). On closer inspection there had been a note of vomiting, but had stopped with cyclizine, and there were no on-going concerns."

"Patient aspirated on LMA supreme – desaturation on transfer to theatre from anaesthetic room and subsequent lithotomy position. NG tube placed in theatre via LMA supreme aspiration-port. >500ml of stomach contents aspirated. Patient given 100% oxygen, suxamethonium 100mg, propofol 50mg modified RSI. Intubated with bougie on table grade 2 view. Suctioning via endotracheal tube - nothing aspirated. FiO₂ 0.6 and ventilated for the rest of the operation, low pressures, good tidal volumes. Duty consultant informed. Plan to continue to extubate and monitor patient in recovery for a slightly prolonged duration to ensure patient stable to be discharged to ward."

"We transferred an obese ITU patient to the CT scanner. Whilst lying flat the patient started to feel nauseous and vomited. We turned the patient to the recovery position and reached for the suction attached to the wall. The suction hosing was not long enough to reach the scanning table and we were therefore unable to suction the patients' airway until an extension had been attached. During this time the patient aspirated some vomit and became hypoxic. Despite supporting her ventilation she arrested on the CT scanner table. We put out a crash call and performed CPR and were able to resuscitate the patient."

The RCoA and Difficult Airway Society (DAS) conducted a prospective one-year audit of major complications of airway management in the United Kingdom, published in 2011 as the 4th National Audit Project (NAP4)^{2,3}. The report is published in the RCoA and DAS websites and provides compelling reading. Each chapter provides an in-depth review of clinical cases, with summary points and learning points.

As with the cases described above, many of the events and deaths reported to NAP4 were likely to be avoidable. 72% of airway complications reported in the NAP4 audit related to general anaesthesia, with the remainder describing airway complications in ICU or the emergency department. Perhaps surprisingly, aspiration of gastric contents was the major cause of airway-related mortality and morbidity in all patients, outweighing both failure to intubate and failure to ventilate. Poor or incorrect assessment of risk of aspiration, and inappropriate use of supraglottic airway devices in high-risk cases was an important factor in airway complications. The report notes that of 24 cases of aspiration reported during anaesthesia, 10 occurred on induction, 13 during maintenance of anaesthesia and one during emergence.

The authors of NAP4 made the following recommendations to reduce the risk of aspiration of gastric contents during anaesthesia:

- Anaesthetists must assess all patients for risk of aspiration prior to anaesthesia. This applies particularly to urgent and emergency surgery. Where significant doubt exists, the higher risk should be assumed
- The airway management strategy should be consistent with the identified risk of aspiration
- Where reasonable doubt exists it is likely to be safer to assume increased risk and plan accordingly
- No matter how low the perceived risk of aspiration, when anaesthesia is induced, the equipment and skills should exist to detect, and promptly manage, regurgitation and aspiration
- On balance, rapid sequence induction should continue to be taught as a standard technique for protection of the airway. Further focused research might usefully be performed to explore its efficacy, limitations and also explore the consequences of its omission
- To maximise the likelihood of good quality cricoid force being applied, those who perform cricoid force should be trained in its methodology, should practise at regular intervals and should consider the use of simple methods of simulation

- If tracheal intubation is not considered to be indicated but there is some (small) increase or concerns about regurgitation risk a second generation supraglottic airway is a more logical choice than a first generation one
- Where aspiration has been recognized as a risk at induction, steps should be taken to reduce the risk of aspiration at emergence

Robinson et al have reviewed decision-making in airway management, and summarise ways to avoid complications relating to aspiration⁴. These authors summarise the Australian guidelines that were drawn up after a review of closed claims⁵:

- An experienced assistant must be available to the anaesthetist at all times
- Intubate all emergency cases
- Apply appropriate cricoid force with all inductions using neuromuscular blocking agents
- Intubate/seriously consider intubation in the following situations:
 - Delayed gastric emptying (pregnancy, opioids, diabetes mellitus, renal failure)
 - Increased intra-abdominal pressure (obesity, ascites, masses)
- Extubate high-risk cases awake and on their side. Extubate all others on their side

Many of these strategies are contentious and certainly not all are routinely employed. Of particular note, Robinson et al point out, there is no robust evidence for the efficacy of cricoid force in preventing regurgitation.

The management of subsequent airway complications in anaesthesia is more clear-cut. Robinson et al state that if aspiration is diagnosed, the airway should be secured and the trachea suctioned, preferably before positive pressure is applied. There is no role for steroids, and antibiotics should only be given if pneumonia develops.

Please also see Rapid Sequence Induction, Anaesthesia Tutorial of the Week 331 (24th May 2016, W Ross and L Ellard)

ACCESS TO CARE

“Patient was on the emergency list on Monday morning for a defunctioning palliative stoma. High-risk anaesthetic so planned as a daytime case. All week the patient got bumped by more urgent cases. The pressure on theatres was escalated to the Director of Clinical Services on Thursday morning but on that day the patient was too unwell for theatre. Rallied on Friday but still too unwell for GA. Attempted stoma under local anaesthetic but the patient had perforated and had peritonitis. Patient died overnight.”

“Patient underwent emergency surgery for a fractured neck of femur. Hypotensive in recovery and on return to ward. Admitted to ICU the next day but subsequently died (multiple organ failure)”

Patients undergoing emergency surgery are highly vulnerable and have higher rates of perioperative morbidity and mortality compared to other patients. These two cases draw attention to patient access to appropriate care with respect to time and level of care. Perioperative mortality rates can be reduced by use of standardised care pathways and attention to detail. The RCoA sets out detailed standards for the provision of emergency anaesthesia services in the Guidelines for the Provision of Anaesthetic Services (GPAS) 2016 document (6). The College includes the following recommendations about systems to protect high-risk patients:

- All emergency patients should be assessed by the surgical team in a timely manner
- The mortality and morbidity risk should be documented prior to surgery
- The multidisciplinary clinical team should be made aware of high-risk patients so that appropriate preparations can be made
- The patient should be assessed for the presence of sepsis and severe sepsis; hospitals should have policies in place for the management of sepsis, in particular the early administration of antibiotics (e.g. as per the surviving sepsis campaign: <http://www.survivingsepsis.org/bundles/Pages/default.aspx>)
- There should be timely access to appropriate care (including resuscitation, antibiotics, interventional radiology or surgery)
- A consultant surgeon and anaesthetist should be present in the operating theatre for patients with an estimated mortality >5% (UK recommendation)
- Anaesthesia for emergency surgery should be delivered by a competent individual, with appropriate supervision
- Trainees should gain experience of emergency anaesthesia; however, trainees must be appropriately supervised at all times
- All high-risk patients should be considered for critical care; as a minimum, patients with an estimated risk of death of ≥10% should be admitted to a critical care location (unless there is a contraindication)

CORNEAL ABRASIONS

“The patient received spinal anaesthesia and sedation for a hip replacement on the trauma list. The spinal was effective but the patient became agitated as sedation took effect, with flailing arms. The patient was reported in recovery to have a painful eye (the eye which was uppermost when positioned for surgery). Examination revealed a small corneal abrasion. Treated with saline eye wash and topical antibiotics. The patient received an apology and appeared happy with the overall treatment received.”

Many injuries sustained during anaesthesia are due to human error and can be avoided. Eye injuries are a good example of this. Overall, perioperative eye injuries are rare, with a frequency estimated at less than 0.1% of general anaesthetics. Corneal abrasions are the most common type of anaesthesia-related eye injuries, and can occur with direct trauma, chemical irritation or exposure. Symptoms include eye pain, blurred vision, photophobia and the sensation of a foreign body in the eye. Redness and tearing are sometimes seen.

General anaesthesia reduces the tone of muscles involved in eyelid closure, such that closure is incomplete and the cornea partially exposed in more than half of patients. Although this can be managed by taping the eyelids shut, general anaesthesia also reduces tear formation, making the eye especially vulnerable to trauma from even apparently innocuous contact with facemasks, drapes, nasal cannulae or other items present during anaesthesia^{7,8}.

After studying the frequency of corneal abrasions in their service, Segal et al. identified the following as risk factors for corneal abrasion⁹:

- Advanced age
- Use of general anaesthesia
- Prone or Trendelenburg positioning
- Supplemental oxygen en route to and in the post anaesthesia care unit (PACU)
- Use of eye tapes

They suggest that rough application or removal of eye tape and patient eye-rubbing postoperatively may be important aetiological factors. In the event of corneal abrasions, they recommend topical antibiotics as the first line of treatment.

SUMMARY

These incident reports provide examples of common complications that occur during anaesthesia and highlight ways in which these complications can be avoided. Gastric aspiration remains a common and potentially lethal complication of anaesthesia. High-risk patients benefit from multidisciplinary team working, early administration of antibiotics in sepsis and access higher levels of care in the postoperative period. Corneal abrasions are a painful complication of perioperative care and are easily avoided.

ANSWERS TO QUESTIONS

1. Regarding pulmonary aspiration of gastric contents:

- False:** More than half of aspiration cases reported in 2011's NAP4 occurred after induction.
- True:** Over 50% of airway-related deaths in NAP4 were as a consequence of aspiration.
- False:** The evidence does not robustly support the effectiveness of cricoid force in reducing regurgitation.
- False:** Antibiotics should only be given once a diagnosis of pneumonia has been made.
- False:** For those at risk of aspiration, extubation awake in the lateral position, is recommended.

2. Regarding emergency surgery:

- False:** Blood cultures should be taken and broad spectrum antibiotics should be given as soon as sepsis or severe sepsis is diagnosed, ideally within 3 hours.
- True:** ICU should be considered in all high-risk patients, unless there is a contraindication to ICU.
- True:** The risks of surgery are higher for emergency cases, particularly for elderly frail patients with co-morbidities. Planning of care requires careful consideration, particularly for elderly patients.
- False:** It is a national UK standard that the consultant surgeon and anaesthetist should be present in theatre for all high risk patients, as a minimum when there is an estimated mortality risk >5%.
- False:** Trainees must be exposed to emergency surgery, but they must be appropriately supervised at all times.

3. Regarding eye injuries sustained during anaesthesia care:

- False:** Dental injuries are the most common cause of litigation against anaesthetists.
- False:** Around 1 in 1000 patients suffer corneal abrasion under general anaesthesia.
- False:** General anaesthetics significantly decrease tear production.
- False:** There are two types of perioperative corneal abrasion- i) caused by direct mechanical trauma and ii) caused by exposure
- False:** The eyelids do not close completely in more than half of patients who undergo general anaesthesia

REFERENCES AND FURTHER READING

1. Safe Anaesthesia Liaison Group <https://www.rcoa.ac.uk/salg>
2. Cook TM, Woodall N, Frerk C; Fourth National Audit Project. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 1: anaesthesia. *Br J Anaesth* 2011;106:617-631.
3. Cook TM, Woodall N, Harper J, Benger J; Fourth National Audit Project. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 2: intensive care and emergency departments. *Br J Anaesth* 2011;106:632-642.
4. Robinson et al. Aspiration under anaesthesia: risk assessment and decision-making. *Contin Educ Anaesth Crit Care Pain* 2013 doi: 10.1093/bjaceaccp/mkt053. Available from: <http://ceaccp.oxfordjournals.org/content/early/2013/11/21/bjaceaccp.mkt053.full>
5. Kluger MT, Short TG. Aspiration during anaesthesia: a review of 133 cases from the Australian Anaesthetic Incident Monitoring Study (AIMS). *Anaesthesia* 1999; 54: 19–26
6. Guidelines for the Provision of Anaesthetic Services (GPAS). Royal College of Anaesthetists 2015. Available from: <http://www.rcoa.ac.uk/news-and-bulletin/rcoa-news-and-statements/guidelines-the-provision-of-anaesthetic-services-gpas>
7. Contractor S. and Hardman J. Injury during anaesthesia. *Contin Educ Anaesth Crit Care Pain* 2006 6:67-70. Doi: 10.1093/bjaceaccp/mkl004. Available from: <http://ceaccp.oxfordjournals.org/content/6/2/67.full>
8. Weed M, Syed N. Perioperative Corneal Abrasions: Systems-based review and analysis. EyeRounds.org. 2012; Available from: <http://EyeRounds.org/cases/152-perioperative-corneal-abrasions.htm>
9. KL Segal et al. Evaluation and treatment of perioperative corneal abrasions. *Journal of Ophthalmology*. 2014 Available from: <http://bit.ly/1SmcHgZ>



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