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Australasian Anaesthesia 2027

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https://doi.org/10.60115/11055/1402

Bronchoalveolar toileting for severe pulmonary aspiration

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INTRODUCTION

Aspiration under anaesthesia is the most common cause of airway-related mortality.[1] The perceived risk of aspiration influences anaesthetic management, theatre efficiency, and theatre utilisation. Despite adherence to risk mitigation strategies, many anaesthetists will still experience a significant aspiration event in their career. Given its incidence, there is limited evidence on how to best manage and train for aspiration under anaesthesia.

While acknowledging the paucity of evidence, this article will examine the literature with the intention of stimulating discussion about the potential for the expedient use of intraoperative bronchoalveolar toileting (BAT) and, perhaps, rationalisation of local guidelines elsewhere in Australia and New Zealand.

A local protocol at the authors' institution (Fiona Stanley Hospital in Perth) was recently developed to empower anaesthetists to perform BAT in the early management of aspiration. This was developed by anaesthetists, in conjunction with intensive care and respiratory physicians, and presented as workshops at national conferences. This protocol will be presented as a practical example with opportunity for adaptation and adoption at other locations.

This article will not cover preventative strategies, which are comprehensively documented elsewhere.

BACKGROUND

The pathology of aspiration

Aspiration is described by inhalation of nasal, oropharyngeal or gastric contents into the lungs. The syndromes associated with it include airway obstruction, aspiration pneumonia and chemical pneumonitis.[2] The severity of the consequences depends not only on the quantity of material, but also on its composition and pH (i.e. particulate matter, bacteria and acid). Furthermore, the patient's immunological response is an important factor. Immediately after a large volume aspiration, fluid and particulate matter may obstruct the airways, preventing gas conduction to the alveoli and directly impairing gas exchange. Understanding the rapid timeline for symptom development is essential. Outside of mechanical obstruction from aspirated contents, the first pathological reaction is an initial burn injury and chemical pneumonitis, which develops in the first one to two hours. Neutrophil-mediated inflammation then develops four to six hours post-aspiration.[3] Aspiration pneumonia may develop within 48-72 hours and is associated with a threefold increase in mortality compared with community-acquired pneumonia.[4] It is thus proposed that early recognition, consideration of immediate BAT, and supportive management form the key principles of management.

The incidence and significance of aspiration in anaesthesia

While its incidence is difficult to fully elucidate, aspiration under anaesthesia complicates 1:900-10,000 anaesthetics and is responsible for 50% of anaesthesia-related deaths.[1,5-7] It also accounts for 16.5% of primary anaesthesia adverse events, defined as an airway complication leading to death, brain damage, unanticipated intensive care unit (ICU) admission or emergency surgical airway.[1]

There is abundant evidence on the mitigation of aspiration risk factors, including recent publications on gastric ultrasound,[8] which highlights its importance within our specialty. Despite its significance, there is a paucity of evidence or guidance on when and how to treat aspiration during anaesthesia. In comparison, formal "can't intubate, can't oxygenate" (CICO) training occurs at least annually in many institutions across Australasia, yet many anaesthetists will never perform front-of-neck access, as its incidence is lower (0.002-0.02% in elective settings) than that of aspiration.[1,9] Aspiration accounts for almost twice the anaesthesia-related deaths compared to CICO situations.[1]

While it is essential to understand how to mitigate the pathological effects of pulmonary aspiration in the first instance, establishing a swift response if it does occur is imperative. Any attempt at an impactful intervention must be conducted promptly and efficiently to secure the airway, reduce the severity of the aspiration, and then commence ventilation of the patient.

Responding to an aspiration event

Once an aspiration event is recognised, immediate management should include oropharyngeal suctioning, Trendelenburg positioning and securing the airway with an endotracheal tube (ETT). Consideration should be given to patient positioning; for example, keeping the patient in a left lateral decubitus position to prevent contamination of the right lung. The airway, once secured with an ETT, should ideally be suctioned prior to ventilation.[10,11] However, the priority in immediate management is oxygenation.

It is crucial to efficiently identify whether BAT is necessary. While routine BAT is not recommended, it should be considered in the presence of particulate matter, high aspirate volume (>50 mL), or clinical manifestations of severe aspiration.[12] The most common cause of lung injury is aspiration pneumonitis, the severity of which is impacted by these factors.[3] Higher volumes of aspirate with higher pH may be better tolerated than low-volume aspirate with low pH.[3] Therefore, as well as facilitating particulate matter removal, early toileting and removal/dilution of acid theoretically minimises the initial burn injury and subsequent inflammatory response. Manifestations of severe aspiration can be evidenced by clinical signs (i.e. tachypnoea, tachycardia, hypoxaemia/hypoxia, crackles, bronchospasm, and decreased breath sounds) or radiological signs (i.e. lobar collapse, major atelectasis, and infiltrates in lung-dependent regions).[11,13,14]

BAL vs BAT

Bronchoalveolar lavage (BAL) is primarily a diagnostic and therapeutic procedure commonly performed in intensive care, pulmonology, and respiratory therapy. Recommendations and methodologies for performing BAL have been well described,[14,15] but it is not a common anaesthesia procedure. In brief, the procedure involves inserting a flexible bronchoscope under direct vision into the desired bronchopulmonary segment. It is then wedged to isolate the relevant (sub)segment before administering sterile saline and applying suction. Samples from the bronchi and alveoli can then be used for diagnostic purposes. In comparison, bronchoalveolar toileting (BAT) utilises several steps similar to those of BAL, but is primarily a therapeutic technique that generally requires lower saline volumes. In non-anaesthesia settings, BAT is generally a less time-pressured technique and is conducted in a more anticipated and controlled setting. Naturally, there is more experience with BAL among our respiratory and intensive care colleagues; however, BAT in the context of an aspiration event is conducted with time urgency and as an emergency response. Anaesthetists' familiarity with handling flexible bronchoscopes, combined with increasing access to them, creates an opportunity to integrate BAT as an essential emergency technique into our procedural repertoire. Acknowledging the prevalence of and complications associated with aspiration events, we suggest that anaesthetists are well poised to establish practices for the provision of immediate therapeutic BAT.

BAT as a treatment in the early phases of pulmonary aspiration under anaesthesia has been previously described; however, specific guidance on indications and methodology is sparse.[10] The evidence for the use of BAT acutely, for example in an operating theatre following aspiration on induction of anaesthesia, has been limited to case reports with favourable outcomes.[16,17]

Bronchial suctioning (without toileting) following an aspiration appears logical and may be a more accepted practice. While this may assist in clearing an airway, the addition of toileting may be more effective in removing residual material and decreasing subsequent chemical or immunological repercussions.[12] There is some evidence that fluid lavage of the lungs, rather than suction alone, improves respiratory outcomes, although further research is required.[18]

The skills required for competency in BAT have an additional benefit from their transferability to other clinical situations. For example, perioperative lobar collapse and airway plugging with secretions, or bleeding requiring bronchoscopic diagnosis and management, all utilise skills that can be applied from practice and application of BAT.[14,15] Furthermore, this skillset extends to blunt chest trauma and lung isolation techniques.[12]

Time-critical application of BAT

Emergency front-of-neck access requires many of the same considerations as an elective tracheostomy, but the urgency and time pressure of a CICO situation require adaptations to expedite airway access. The same parallels can be drawn between BAT and BAL. The time pressure to complete the sequence of events for BAT in an acute aspiration situation can be demonstrated through a simple case example, such as a large-volume aspiration in an endoscopy suite.

An elderly patient undergoing an endoscopic retrograde cholangiopancreatography regurgitates and aspirates a large volume of bilious and gastric content. Time-critical coordination and execution of an intervention is now required.

Step one is recognising the event. At this point, the decision to intervene and consider BAT has begun. The prone patient is rapidly returned to a supine position, and the airway is secured via a rapid-sequence induction with a size 7 ETT. While the necessary equipment to undertake BAT (Table 1) is being gathered, the patient is transitioned to total intravenous anaesthesia (TIVA), and haemodynamically stabilised. In this example, bronchoscopy was performed using an Ambu® aScope™ via a Bodai connector, identifying significant contamination in the left upper and lower lobes. These were initially suctioned via the bronchoscope, then toileted with a total of 230 mL of warm, sterile 0.9% NaCl using a 50 mL Luer Lok™ syringe, instilling 30 mL aliquots, until clear. The bronchoscope was withdrawn on two occasions to allow ventilation, re-oxygenation, and treatment of an episode of rapid atrial fibrillation before continuing. After completion of the BAT, antibiotic coverage with piperacillin/tazobactam was commenced, and the patient was transferred, intubated, to the ICU. In this scenario, with equipment readily available and staff with institutional experience in conducting BAT, the procedure should take approximately 10 minutes.

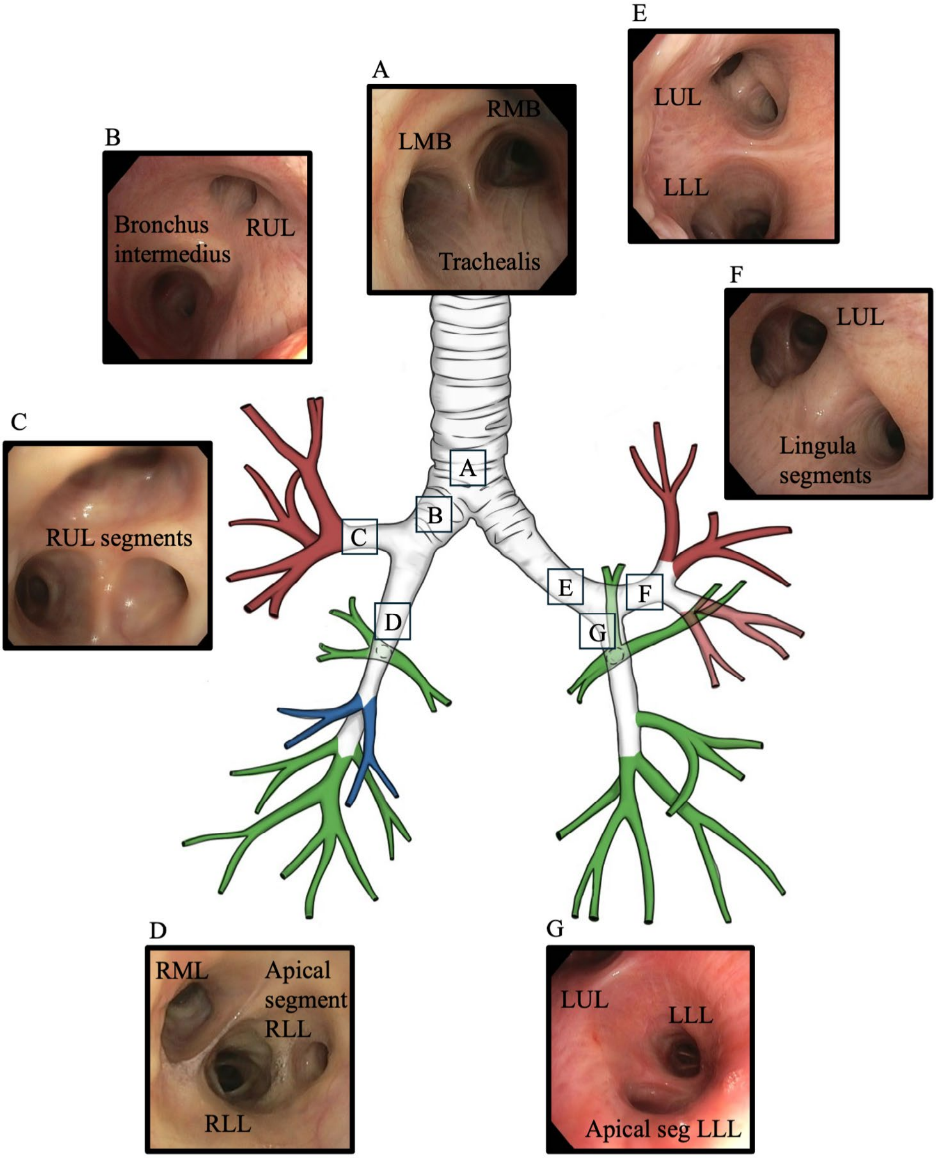
While not as complex as conducting a fibreoptic intubation, the necessary equipment still needs to be acquired, set up, and utilised, the speed of which will vary based on the individual resources and logistics of your local experience and practice setting. Once practitioners and facilities become more familiar with conducting BAT, the time from decision to BAT completion will decrease.

Efficient identification and clearance of aspirated materials will be heavily facilitated by familiarity with navigating and inspecting the bronchopulmonary tree. The following is an initial guide for the practitioner.

Anatomy

A systematic inspection of the bronchopulmonary tree after an aspiration event and during BAT is essential to detect and treat pulmonary aspiration. A basic understanding of anatomy, combined with a stepwise, systematic approach, outlined in Figure 1, is required. Furthermore, knowledge of approximate lengths and diameters of landmark bronchi may be helpful but is not essential.

Figure 1. Bronchopulmonary anatomy



Red represents upper lobes (xUL), blue represents right middle lobe (RML), pink represents lingula segments and green represents lower lobes (xLL).

Figure 1 displays a colour-coded representation of the bronchopulmonary segments in relation to the upper, middle and lower lobes of the lung, including bronchoscopic images taken at our institution. The trachea is bounded anteriorly by C-shaped cartilaginous rings and posteriorly by the trachealis muscle, an important landmark for supporting correct orientation. The adult trachea is approximately 20 mm in diameter and 120 mm long, terminating at the carina where it then divides into the left and right main bronchi (Figure 1a). The left main bronchus is typically 50 mm long and up to 18 mm in diameter, whereas the right is 25 mm long and slightly wider at up to 21 mm in diameter. Following the origin of the right upper lobe (Figure 1b and c), the right main bronchus becomes the bronchus intermedius (Figure 1b), which is 30 mm in length and then divides into the right middle and lower lobar bronchi (Figure 1d).[14] The left main bronchus divides into the left upper lobe and the left lower lobe (Figure 1e). The left upper lobe contains the left upper lobar and lingula segments (Figure 1f). After the left upper lobe bronchi, you find the apical segment of the left lower lobe and then the rest of the segmental bronchi (Figure 1g). These secondary (lobar) bronchi further split into tertiary (segmental) bronchi, and these are what supply the commonly described bronchopulmonary segments. Bronchi will split several more times, ultimately becoming terminal and respiratory bronchioles, which lack cartilage. The respiratory bronchioles are connected to alveolar sacs, where gas exchange occurs.

Tertiary bronchi are typically where we recommend performing therapeutic BAT. The diameters of these bronchi are typically between 4-7 mm according to imaging studies.[19] As such, our typical bronchoscopes are roughly the same diameter to allow placement just proximal to these bronchi during therapeutic BAT. There is, of course, variation in anatomy, and care should always be taken when advancing bronchoscopes to avoid iatrogenic injury.

While committing every bronchopulmonary segment to memory may be difficult for anaesthetists who do not perform bronchoscopies regularly, being able to recall the expected number of bronchopulmonary segments encountered through the secondary and tertiary bronchi will prevent the omission of any lung segments.

Procedure

Optimisation of the patient's cardiorespiratory system should occur before BAT. We suggest using TIVA and muscle relaxation. A dedicated assistant, separate from the BAT proceduralist, should ideally be tasked with patient monitoring and ventilation during BAT. Clinicians should be cognisant that this procedure is not without risk. Vigilance, limiting scope time in the airway, and an understanding of the associated physiological effects may help mitigate complications.[13]

Safe ventilation is essential while performing BAT. For this to occur, an endotracheal tube should ideally be more than 1.5 mm larger than the external diameter of the chosen flexible bronchoscope.[13] The authors' preferred choice is to use an Ambu® aScope™ Large (e.g. 5.8 mm external diameter) through a 7.5 mm internal diameter (or larger) endotracheal tube. Regardless of the scope used, a large suction channel (e.g. 2.8 mm) is required to provide effective toileting. In the non-intubated patient, bronchoscopes occupy 10-15% of the tracheal cross-sectional area. In comparison, a 5.7 mm bronchoscope would occupy 40% of the area of a size 9.0, and 66% of the area of a size 7.0 mm endotracheal tube (Table 1).[13]

Table 1. BAT equipment

- ☐ **Ambu® aScope™ Large (5.8mm)**
  from ICU respiratory tech workroom
- ☐ **Ambu® aView™ screen**
  from anaesthetic tech workroom
- ☐ Cut (crosshair) bodai connector
- ☐ PPE – gloves, gown, N95, eye protection
- ☐ Lubrication (saline or sterile optilube)
- ☐ Anaesthetic machine suction ≤120cmH2O
- ☐ 0.9% Saline and 20/50ml syringes

The rapidly intubated patient with a 7.0 mm endotracheal tube following aspiration is not an uncommon scenario. The authors' preference in this situation would be to proceed with BAT; however, positive end-expiratory pressure (PEEP) and tidal volumes should be reduced to minimise auto-PEEP and the risk of barotrauma. One may consider upsizing the endotracheal tube following gastric decompression if the risk of further aspiration is deemed low.

The connection between the syringe, through which the lavage will be provided, and the chosen bronchoscope will vary. With the Ambu® aScope™, a slip-tip syringe is required to connect directly, whereas a Luer Lok™ syringe will require a slip-tip adaptor (which is currently provided with the aScope™) (Figure 2). We use 0.9% sterile saline for lavage, at either warm (37 degrees Celsius) or room temperature, in aliquots of 20-30 mL. Warm saline is preferred; however, this should not delay treatment.[20]

Figure 2. Slip-tip connector that comes with the Ambu® aScope™

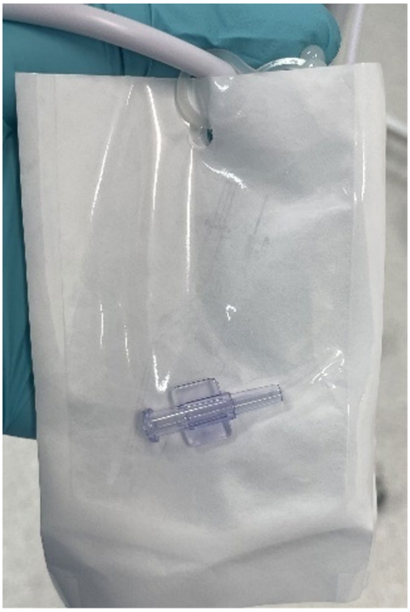
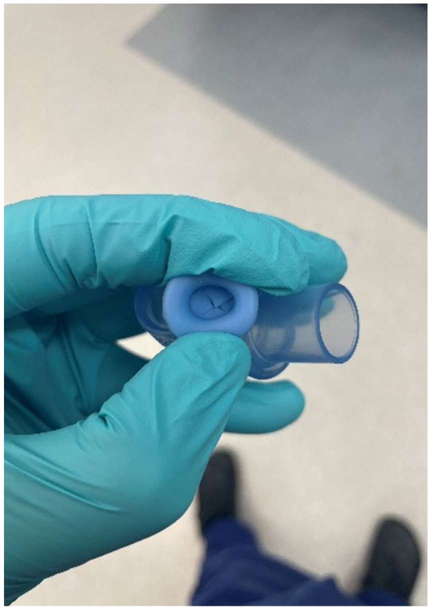


Figure 3. Bodai connector to allow simultaneous ventilation and bronchoscopy



An adaptor that minimises air leakage while allowing easy passage of the bronchoscope into the ETT is also required. A Bodai connector comes with a pre-existing slit in the membrane. While this ensures an airtight seal, the smooth passage of the bronchoscope may be restricted. In addition to lubricating the bronchoscope with sterile saline, OptiLube®, or Medilube®, we suggest creating an additional perpendicular slit in the diaphragm by hand to minimise this restriction, as shown in Figure 3.

Personal protective equipment should not be forgotten, and includes gloves, a gown, eye protection and an N95 face mask. A sterile set-up is preferable; however, in an emergent situation, an aseptic non-touch technique is acceptable. Supine patient positioning, with the bed lowered, will help with the ergonomics of the procedure. The use of a step stool may also ensure the proceduralist has adequate height above the patient, remembering that bronchoscopes are long devices best operated when straightened.

To maintain adequate oxygenation and ventilation during the procedure, we recommend the following ventilation settings: FiO2 1.0, volume-targeted, pressure-limited ventilation and 5 cm H_2O PEEP. The pressure and volume alarms may also be adjusted, as these are likely to cause distraction during the procedure. Suctioning removes gas from the anaesthesia circuit, so we recommend high fresh gas flows during suctioning or BAT. The use of TIVA provides reliable anaesthesia and prevents volatile gas waste during bronchoscope suctioning.

During BAT, any obvious gastric or particulate matter should be suctioned as soon as possible, using a suction pressure < 120 cmH_2O to avoid airway collapse. Large pieces of particulate matter may be removed by gentle and continuous application of suction, securing the debris at the end of the bronchoscope while withdrawing it. Care should be taken to avoid mucosal trauma. If suctioning alone is insufficient, then consideration should be given to proceeding with BAT.

The volume of instilled saline is not standardised, even for diagnostic BAL, thus the amount to use in therapeutic BAT following aspiration is unclear.[10,21] The goal is to clear foreign material with the lowest possible volume. 60 mL of lavage should be considered enough to perfuse the proximal airways, while 120 mL should perfuse the bronchopulmonary segment.[14] Importantly, the first aliquot of saline tends to be poorly retrieved, with less than 20 per cent returned, but subsequent injections improve recovery to 40 to 70 per cent.[10,22] Gravity dictates that anterior segments generally have a higher return compared to posterior segments (in the supine position). We recommend injecting aliquots of 20-50 mL, remembering that we should aim to minimise the total volume. If not done so already, toileting of a segment should be discontinued when the instilled saline returns clear or the instilled volume exceeds the amount recovered by 100 mL.[10,22] After BAT is performed on the segments deemed necessary on initial inspection, we recommend a final systematic inspection of the bronchopulmonary segments, if tolerated by the patient. This helps to quantify any residual sections that still contain visible contamination and can be handed over upon transfer to the ICU. The volume of saline required is highly variable and dependent on many factors. In the authors' experience, a severe aspiration typically requires up to 300 mL of lavage for the entire procedure. In contrast, albeit anecdotally, much higher volumes have been used to clear mucus and blood from a single lobe, where multiple lavage attempts are needed to retrieve stubbornly adherent contaminants.

Challenges

Anatomical orientation during BAT can be challenging due to human and technical factors, such as intermittent ventilation and foreign material obscuring the camera view. Identifying unique anatomical characteristics can be invaluable in establishing your location. Examples of this include but are not limited to: the posterior muscular wall of a bronchus, the steep take-off of the right upper lobe, and remembering that the right middle and lingula lobes are anterior structures, whereas the apical segments of the lower lobes are posterior anatomical structures (Figure 1.), or other anatomical characteristics. In practice, when identifying your location remains challenging, withdrawing the scope to more proximal segments, even as far as reidentifying the carina (Figure 1a), is a helpful technique for reorientation. If the bronchoscope does not advance, which is not uncommon, especially beyond the secondary bronchi, slowly withdrawing and gently redirecting the scope angle may help. The scope should never be inserted with force due to the risk of perforation. A larger endotracheal tube or a smaller bronchoscope may help to reduce friction and improve the mobility of the bronchoscope.

Another common issue during BAT is poor visualisation caused by lens fogging or secretions. Warming the bronchoscope before use may minimise condensation, while regular suctioning, instilling saline, or gently touching mucosal surfaces may also help remove fogging or secretions.

Significant adverse physiological effects may occur with BAT, and the risks and benefits of the procedure should be carefully balanced. These, along with contraindications to BAT, are summarised in Table 2.

Table 2. Extract from guidelines by Fiona Stanley and Fremantle Hospitals Group: "Bronchoalveolar toilet: An anaesthetist's guide"

Contraindications *All relative as emergent procedure* *Consider risks and benefits to each patient*	
Airway/respiratory	ETT ≤7 Active bronchospasm Pneumothorax SpO_2 90% on FiO_2 1.0
With 5.7 mm scope - 40% of size 9 ETT and 66% 7 ETT occupied. Auto-PEEP of up to 35 cm H_2O recorded with size 7 ETT but usually remains below 20 cm H_2O with size 8. 30% increase in FRC and 40% reduction in FEV1. Post-procedure changes in dynamic and static compliance occur primarily because of alveolar collapse but suctioning and instillation of saline will wash out surfactant and affecting lung compliance. Transient hypoxia and hypercapnia common. $PaCO_2$ increases by 30% with suctioning – usually unable to compensate by increasing minute ventilation. Rarely can get reflex bronchospasm by stimulation of vagal receptors – minimise suction time to prevent recurrence.	
Cardiovascular status	Haemodynamic instability Acute cardiac ischaemia
Expect 40% increase in heart rate (HR), 30% rise in blood pressure (BP) and cardiac index increase 17-32%. 20% of those over 60 have some degree of cardiac strain. 55-58% experience tachyarrhythmias and 5-8% brady-arrhythmias. Peri-procedure myocardial infarction (MI) related to HR and BP rather than hypoxia. Mortality 5% if within 30 days of MI.	
Haematological	Coagulopathy
Risk factors – anticoagulants, liver disease. Check haemoglobin, platelets, coagulation screen but these do not accurately predict bleeding risk. Little evidence that correction of clotting pre-procedure reduced clinically relevant bleeding.	
Neurological	Raised intracranial pressure
Metabolic	pH <7.2
$PaCO_2$ 8 mmHg average increase with presence of bronchoscope but increases by 30% with suctioning.	

Reproduced with permission from Fiona Stanley and Fremantle Hospitals Group (FSFHG). Table adapted from original data relating to diagnostic BAL, rather than therapeutic BAT.[13]

Hypoxia, hypercarbia, tachycardia and hypertension are perhaps the most common derangements encountered, in the authors' experience, and it is not uncommon to have to pause the procedure intermittently to stabilise the patient. During periods of instability, important complications, such as pneumothorax, should be actively excluded. It is not unexpected to see tachyarrhythmias associated with an increased myocardial oxygen demand. While the data isn't conclusive, BAL is potentially associated with up to a 5% mortality risk in patients with active myocardial ischaemia. So myocardial injury should be a consideration during BAT.[13]

Major bleeding is rare but should be taken very seriously. If there is emergent bleeding, the proceduralist may attempt to wedge the bronchoscope to reduce blood entering other segments. Cold 0.9% normal saline should be administered, and assistance from respiratory and/or ICU physicians should be requested as soon as possible. Lateral positioning, with the bleeding lung in the dependent position, may also be considered to avoid contralateral contamination. Bronchoscopic management of a major pulmonary haemorrhage is not within the scope of our practice.

Important post-procedure considerations are summarised in Table 3. While current evidence overall suggests low complication rates, BAT is not without risk, and clinicians should remain vigilant for complications following the procedure. Extrapolating from BAL evidence, the mortality rate is as low as 0.02%, with a serious complication rate of 1.1%.[13,24] Most side effects are thought to be related to technique, the extent of the area toileted, and the temperature of the saline. This highlights the importance of training prior to performing BAT.

Table 3. Extract from guidelines by Fiona Stanley and Fremantle Hospitals Group: "Bronchoalveolar toilet: An anaesthetist's guide"

Post-procedure

Recruitment manoeuvres	30cm H_2O for 30secs PEEP 10-12
Positioning	If lobar collapse keep segment non-dependent If ongoing risk of airway contamination keep pathology dependent
Complication monitoring	Transient pyrexia Hypoxia Pulmonary oedema Bronchospasm Pneumothorax Haemorrhage Pulmonary hypertension Arrhythmias Cardiac ischaemia Death (0.01-0.04%)
Antibiotics	If reaching for bronchoscope likely severe aspiration event so antibiotic cover indicated. Augmentin first line. Tazocin for life threatening cases.
Chest X-ray	In all but most minor bronchoscopy to exclude complications. Expect to see infiltrates.
Bronchoscope cleaning	Flush with saline Consider low foaming detergent Remove debris
Patient destination	Consider ICU Proceed vs delay surgery

Education

Competently managing an aspiration event is a unique skill that can help in mitigating the associated morbidity and mortality. These skills and techniques fall within a core component of anaesthesia training. The ANZCA curriculum states that introductory trainees are expected to be able to outline management plans for patients with aspirated gastric contents, and that trainees of all levels are expected to be able to manage this life-threatening situation in the perioperative period. The explicit acknowledgement of the importance of managing aspiration events would benefit from hands-on and simulation-based training, similar to what is currently provided for CICO situations.

At present, there are no universal or authoritative guidelines on the performance of BAT for anaesthetists. Bronchoscopy simulations utilising animal models and high-fidelity virtual reality simulators are available and have an evidence base in novice bronchoscopists.[25-27] These learning modalities could easily be transferable to the anaesthetist. Furthermore, certain simulators may also offer training in difficult airway and fibreoptic tracheal intubation, which can assist in training for the fibreoptic components of BAT. Practical bronchoscopy courses are available throughout Australia and New Zealand, utilising manikins, simulators, and cadavers. While primarily targeted towards intensive care and respiratory physicians, such courses are often highly regarded by anaesthesia attendees as they provide expert feedback from senior respiratory physicians.[28] There are also several phone applications and online resources available to facilitate familiarisation with anatomy and the systematic performance of bronchoscopy.[29]

While there are numerous ways to upskill in flexible endoscopy, it would be beneficial to have an objective assessment of how effectively and safely we are able to perform this procedure. The Bronchoscopy Skills and Tasks Assessment Tool (BSTAT) or the structured progress score are examples of objective assessment tools used by bronchoscopists.[27,29] The BSTAT is a 10-step evaluation that grades an operator and is performed at regular intervals. The BSTAT has demonstrated a high degree of accuracy and precision. A similar assessment tool, developed specifically for anaesthesia care, may help ensure that anaesthetists can perform this procedure effectively and safely, and allow departments to quantify skill certification.

Summary

Bronchoalveolar toileting should be considered early in the management of severe pulmonary aspiration. Anaesthetists are well positioned to perform this procedure, and there is a strong case for establishing specific training to ensure it is performed effectively and safely. Additionally, departmental training and protocols will help ensure consistency and efficiency in activating this process in emergency situations. There are several ways anaesthetists can upskill in this procedure, and we suggest that formalised training be considered within anaesthesia departments. As this technique becomes more refined and tailored to our perioperative environment, developing a unique name to better differentiate it from current BAT procedures will likely be valuable. Implemented broadly and integrated into our emergency response portfolio, bronchoalveolar toileting is well positioned to become an essential and invaluable therapeutic intervention in the perioperative space.

Acknowledgement

We would like to acknowledge Dr Lokesh Yagnik, Dr Matthew Salamonsen, Dr Cameron Prosser and Kiara Belamide for their input into this body of work.

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