

Editorial

Extubation of the difficult airway – an important but neglected topic

Ask practising anaesthetists what they think is the greatest problem with the difficult airway and almost all will focus on difficult mask ventilation or difficult intubation, or – as the worst case – a ‘cannot-intubate-cannot-ventilate’ situation. This is intrinsically not logical. Fortunately, a true difficult airway scenario at induction of anaesthesia is rare. The incidence of a cannot-ventilate situation, for example, is about 1:700 [1]. Cannot-ventilate-cannot-intubate scenarios therefore occur even more rarely. What must never be forgotten, however, is that a patient’s airway has not usually become any ‘easier’ by the end of surgery (although there are certainly a few exceptions). Sooner or later, every tracheal tube or supraglottic airway – most frequently a laryngeal mask airway – has to be removed. From a safety point of view, this means that a stable airway condition is going to become unsafe until the patient has his/her airway under control, thus entering a vulnerable and therefore potentially dangerous situation. This was recently highlighted by a large survey in the UK showing that almost 30% of all adverse events associated with anaesthesia occur at the end of anaesthesia or during recovery [2]. Evidence of poor anticipation and planning for extubation was present in nearly 50% of cases.

Interestingly, relatively little has been published about this tricky period of anaesthesia (referred to as ‘extubation of the difficult airway’ in the following) compared with the large body of literature on the management of the potentially difficult airway during induction of anaesthesia, even though we know from the closed claims study from the USA [3] that death and severe brain damage were more often associated with extubation or the recovery period, and therefore should attract more attention. The truth is that only a few airway enthusiasts, such as Cooper, have devoted much time to studying extubation of the difficult airway [4]. Review of guidelines published by anaesthesia societies on management of the difficult airway include only very superficial recommendations such as “each anaesthesiologist should have a preformulated strategy for extubation of the difficult airway” or “an airway management plan for dealing with post-extubation hypoventilation” should be available [5, 6].

This issue of *Anaesthesia* publishes guidelines from the Difficult Airway Society (DAS) for the management of tracheal extubation [7]. It is a very comprehensive article written by practising experts in airway management. The topic has been thoroughly reviewed and is supported by three identically formu-

lated, self-explanatory flowcharts. The stepwise approaches taken for the ‘Basic Algorithm’, the ‘Low Risk Algorithm’ and the ‘At Risk Algorithm’ are well-known from the DAS guidelines for the management of the unanticipated difficult intubation [8] and divide the process into four steps: ‘Plan Extubation’; ‘Prepare for Extubation’; ‘Perform Extubation’; and ‘Postextubation Care’. To finish, the authors describe in detail two relatively common problems at extubation, laryngospasm and post-obstructive pulmonary oedema, followed by an ‘airway alert form’. It is worth highlighting a few of the authors’ main points here.

First, the authors correctly point out that no single technique covers all clinical scenarios and that no technique is without risk. The ultimate decision to remove the tracheal tube or supraglottic airway device or to postpone the procedure is primarily based on experience. In order to gain this experience, it is extremely important to train in these special techniques – for example, airway exchange catheter-assisted extubation – on ‘non-difficult’ cases before attempting them in a difficult airway situation. In the same way, it is imperative to focus only on few different approaches rather than trying to use the entire repertoire of techniques in very small numbers of cases. This statement is primarily

based on everyday practice and experience rather than hard scientific evidence, which is hardly surprising, since there are hardly any evidence-based findings in this area.

Second, the authors correctly emphasise that adequate staffing and communication are essential, and that an anaesthetist must always be immediately available. This was also shown by a large case-control study from the Netherlands involving almost 870 000 patients, that aimed to identify relationships between risk factors for anaesthesia management and 24-hour postoperative severe morbidity and mortality [9]. Factors associated with a statistically significantly decreased risk for severe morbidity and death were: the implementation and documentation of an equipment check; the direct availability of an anaesthetist; no change of anaesthetist during anaesthesia; the presence of a full-time anaesthetic nurse; the reversal of neuromuscular blocking agents; the application of postoperative pain medication; and the presence of two persons compared with only one person at the emergence of anaesthesia.

The third – and probably most controversial – aspect is the mysticism surrounding guidelines themselves. In the ‘hierarchy of obligations’, guidelines are located between algorithms, practice policies and standards [10–12]. For the practising physician, guidelines are sometimes seen as voluntary recommendations that assist the practitioner in making decisions whereas standards provide rules or minimum requirements for clinical

practice and are generally accepted mandatory principles for patient management, for example the use of ECG or pulse oximetry for general anaesthesia. In recent years, however, guidelines have rapidly become ‘standards of care’ in that deviations from them can be seen as representing substandard care.

In addition to their possible ‘voluntary’ aspect, guidelines have a further problem: the effectiveness of guidelines in daily practice – in other words, the degree to which they are implemented or the degree of compliance with them – is unfortunately far from clear. It is still very controversial whether guidelines really do have an impact on the improvement of patient care [13]. One reason for this is the increasing number of guidelines and recommendations, as highlighted by Carthey et al. in a recent article in the *British Medical Journal* [14] and by an even more recent editorial in this journal [15]. A further aspect affecting compliance is information overload and the extreme difficulty in distinguishing between relevant and irrelevant information. The term ‘overload’ in this context not only refers to the content of a specific guideline, Carthey et al. point out, but also to the need to access a wide range of different sources. In our speciality, for example, guidelines for anaesthetists are managed by more than 20 associations and societies [14]. Carthey et al. also suggest that rules are primarily broken because guidelines are not standardised and are too complex. To improve compliance, guidelines must reflect the real world, and clinicians must be aware

of the real benefits of flowcharts and policies.

Further reasons to question the effectiveness of guidelines are the level of quality and the extent of implementation. In a recent editorial in the *European Journal of Anaesthesiology*, Moore et al. [16] stated: “*the trouble with evidence-based medicine is that most of it is wrong; just because a guideline claims to be evidence-based does not necessarily mean that it gives the correct advice*”. The authors further point out that “*too many guidelines include poor quality evidence and they constitute nothing more than hot air unless local action makes them work*”.

And finally, in a recent review in this journal about the question ‘whether there is a role for clinical practice guidelines in airway management’, Crosby argued that there are simply not enough data to support every recommendation concerning airway management [17].

So, what does this mean for DAS’s guidelines for the management of tracheal extubation, knowing that they are primarily based on experience and expert opinion rather than firm evidence? The level of hierarchy of evidence tells us that high quality meta-analyses and systematic reviews of randomised, controlled trials are on top, whereas expert opinions are at the bottom of this ladder [18]. If we try to justify our decisions in the area of airway management in general, and in extubation of the difficult airway in particular, on only firm evidence, it would be impossible for us to take

decisions. Does that mean that we should ignore facts unless they come from prospective, randomised studies, or is there a more pragmatic way to go?

In a recent article in the *New England Journal of Medicine* about 'pragmatic trials', Ware and Hamel [19] pointed out that it is justified to sacrifice internal validity to achieve generalisability. In other words, they say, even though randomised trials provide high-quality evidence, many studies have only limited relevance to clinical practice. It is absolutely conceivable that, for example, the under-representation of certain patients in randomised trials influences their value for everyday practice [20]. Since the DAS guidelines do reflect clinical practice, are simple and pragmatic, and assist the practitioner in specific clinical situations we are all faced with, they *are* relevant for everyday practice. Nevertheless, the members of the DAS should be encouraged to set up 'pragmatic trials', for example, carefully designed and performed observational (case-control) studies [9, 20], so that the usefulness of these guidelines can be underpinned scientifically.

The authors of the new guidelines must be congratulated for this immense piece of work. One can only hope that these pragmatic guidelines for the management of tracheal extubation will receive the same attention and acceptance as DAS's guidelines for management of the unanticipated difficult intubation, and thus will ultimately improve safety for our patients.

Competing interests

No external funding and no competing interests declared

T. Heidegger

Associate Professor of Anaesthesia
Department of Anaesthesia
Spitalregion Rheintal Werdenberg
Sarganserland
Walenstadt, Switzerland
Email: thomas.heidegger@srrws.ch

References

1. Khetarpal S, Martin L, Shanks AM, Tremper KK. Prediction and outcomes of impossible mask ventilation: a review of 50,000 anesthetics. *Anesthesiology* 2009; **110**: 891–7.
2. Cook TM, Woodhall N, Frerk C, on behalf of the 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. *British Journal of Anaesthesia* 2011; **106**: 617–31.
3. Peterson GN, Domino KB, Caplan RA, Posner KL, Lee LA, Cheney FW. Management of the difficult airway: a closed claims analysis. *Anesthesiology* 2005; **103**: 33–9.
4. Cooper RM. Extubation and changing endotracheal tubes. In: Hagberg CA, ed. *Benumof's Airway Management*. Philadelphia: Mosby, Elsevier, 2007: 1146–80.
5. American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Practice guidelines for management of the difficult airway: an updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. *Anesthesiology* 2003; **98**: 1269–77.
6. Crosby ET, Cooper RM, Douglas MJ, et al. The unanticipated difficult airway with recommendations for management. *Canadian Journal of Anesthesia* 1998; **45**: 757–76.
7. Popat M, Mitchell V, Dravid R, Patel A, Swamipillai C, Higgs A. Difficult Airway Society Guidelines for the management of tracheal extubation. *Anaesthesia* 2012; **67**: 318–40.
8. Henderson JJ, Popat MT, Latto IP, Pearce AC. Difficult Airway Society guidelines for management of the unanticipated difficult intubation. *Anaesthesia* 2004; **59**: 675–94.
9. Arbous MS, Meursing AE, van Kleef JW, et al. Impact of anesthesia management characteristics on severe morbidity and mortality. *Anesthesiology* 2005; **102**: 257–68.
10. Pasch T. Standards, Richtlinien, Empfehlungen. In: List WF, Metzler H, Pasch T (eds.) *Monitoring in Anästhesie und Intensivmedizin*. Berlin: Springer-Verlag, 1995: 122–38.
11. Eddy DM. Clinical decision making: from theory to practice. Designing a practice policy. Standards guidelines and options. *Journal of the American Medical Association* 1990; **263**: 3077.
12. Heidegger T, Gerig HJ, Henderson JJ. Strategies and algorithms for management of the difficult airway. *Best Practice & Research: Clinical Anaesthesiology* 2005; **19**: 661–74.
13. Woolf SH, Grol R, Hutchison A, Eccles M, Grimshaw J. Potential benefits, limitations, and harms of clinical guidelines. *British Medical Journal* 1999; **318**: 527–30.
14. Carthey J, Walker S, Deelchand V, Vincent C, Griffiths WH. Breaking the rules: understanding non-compliance with policies and guidelines. *British Medical Journal* 2011; **343**: d5283.
15. Ummenhofer W, Suhm N. Fractured neck of femur: guidelines and beyond. *Anaesthesia* 2012; **67**: 2–4.
16. Moore RA, Derry S, Aldington D. From evidence-based medicine to guidelines and recommendations: a long and winding road. *European Journal of Anaesthesiology* 2011; **28**: 753–5.
17. Crosby ET. An evidence-based approach to airway management: is there a role for clinical practice guidelines? *Anaesthesia* 2011; **66** (Suppl 2): 112–8.
18. Harbour R, Miller J. A new system for grading recommendations in evidence based guidelines. *British Medical Journal* 2001; **323**: 334–6.
19. Ware JH, Hamel MB. Pragmatic trials – guides to better patient care. *New England Journal of Medicine* 2011; **18**: 1685–7.
20. Rawlins M. De Testimonio: on the evidence for decisions about the use of therapeutic interventions. *Clinical Medicine* 2008; **8**: 79–88.

doi: 10.1111/j.1365-2044.2011.07043.x