

Airway assessment/management paradigm - does a spectral or a binary approach fit better?

Pandit's eloquent editorial has raised more questions concerning the place of airway assessment and its relationship to difficult airway management, while advocating the validity of a binary approach to airway testing [1].

Binary concepts are common in human thought as we have a tendency to perceive our environment as such e.g. good or evil, guilty or not, dead or alive. They often provide an initial structure for human understanding by simplifying complex systems and allowing us to understand and communicate rapidly. However, steadfast adherence leads to blind spots in understanding and potential failure when dealing with real world complexities. If we adopt only a binary approach and fail to question further, we are in danger of not investigating the system fully and simply perpetuating the binary.

Post-modernism fought binary thinking by advocating the creation of more multifarious models and theories to replace the binary approach and understand the complexity of the real world. However, the complete abolition of a binary approach and obtaining a full understanding of difficult airway assessment and management complexities may be well beyond the capabilities of many doctors exposed to airway management. Most of us retain and use our airway assessment techniques taught to us at an early stage of our career without a complete understanding of how they impact on our management. As Fyodor Dostoyevsky (in *Demons* Chapter 2 II) said, "It seems, in fact, as though the second half of a man's life is made up of nothing, but the habits he has accumulated during the first half." During our career we accumulate a sum of experiences that provides us with an intuitive understanding of difficult airways and how they should be managed. Airway management skills are developed over time and through experience.

The fundamental flaw of binary assessment is the likelihood that it leads to binary management. Pandit rightly suggests "regarding predictive tests as screening rather than diagnostic." This places the battery of bedside testing in its correct place as the start of a clinical process upon which further testing, such as imaging nasopharyngoscopy, ultrasound and then airway management, is built.

However, we disagree when he states, "the difficult airway could and should be regarded as a syndrome, composed of very many individual rare diseases...there is little commonality between each of our rare airway diseases other than that they are not easy". This seems to imply that a difficult airway classification is impossible to develop. However, categorizing difficult airways remains key to better understanding and clear management strategies [2].

Yentis [3] pointed out that the word "difficult" is a subjective term in airway management, and may be influenced by several factors including human factors, experience, location, patient factors, equipment and time pressure [4]. Such complex interrelationships are not easily assessed with a binary approach. Relying purely on a screening test for management rather than further exploration of the possible pathology is likely to lead to management failure. He further stated "The first problem is defining the problem" [5]. The current paradigm focuses the definition of the difficult airway on the management outcomes (i.e. failure is defined by number of attempts, use of specialized airway equipment and/or adverse outcomes such as arterial oxygen desaturation) rather than understanding airway morphology and pathology. Since other medical conditions and diseases are identified and classified based on the disease pathology rather than success or not of treatment modalities, why should a similar approach not apply to airway management?

The cornerstone of medical care is the "diagnosis-management paradigm". Teaching the assessment of normal and difficult airways should begin with an understanding of airway morphology [6-8], which then allows the clinician to tailor a specific treatment for each subclass and specific type of airway abnormality [9]. While a more simplistic binary approach may be reasonable for screening, the gold standard for airway assessment-management paradigm should be based on a comprehensive anatomical approach.

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Reply:

Greenland et al. criticise a ‘binary’ approach to prediction (easy vs difficult) or to management (routine vs advanced) and instead appear to argue in favour of ‘better categorisation’. It is unclear what they mean by this, but their ‘comprehensive anatomical approach’ implies a tailored management plan for each and every patient. In some self-evident respects they are theoretically correct. Each of us has a unique genotype and hence, a unique airway phenotype. There are several billion individuals on the planet, and the logical extension of their argument is that there should be several billion corresponding airway management plans, tailored for each of our unique anatomies. Anything less than this is mere reductionism, with binary being but an extreme form [1].

On a practical level, the fallacy of Greenland et al.’s argument can be seen by considering their approach to what most of us would readily class as an ‘easy’ airway (ie, the vast majority of the billions on this planet). By their logic, the airways of all these patients should undergo extensive imaging etc, in order to tailor the exact supraglottic airway (SAD) type and size, or other management method that fits the specific anatomy. Instead using a binary pragmatic approach as we suggest, these patients are simply to be classed ‘plausibly easy’ and any SAD to hand could then be used. Only if it does not work well, should it be

pragmatically exchanged for another (type or size) [2], or in the rare event of true airway difficulty (despite signs of ‘easy’) then difficult airway algorithms applied [3,4].

Thus in the binary approach we advocate, it is only for airways predicted ‘plausibly difficult’ (ie, not easy) that a tailored approach to management is really necessary. Although the management plan may then be ‘binary’ - to the extent that for these patients it can be described as ‘advanced’ - it can differ between patients, for the reason we stated that ‘no two difficult airways are alike’. Implicit in our analysis therefore was the acknowledgement that the ‘plausibly difficult’ included a range of airway types that could be subjected to further detailed sub-classification. We were therefore surprised to read that Greenland et al. did not agree with our suggestion that the difficult airway should properly be viewed as a syndrome of many rare diseases, since this is actually consistent with their own suggested approach.

The problem can be re-stated as a modelling one. When modelling a phenomenon in the natural world such as difficult airway prediction, we may obtain greater precision by making the model ever more complex with additional parameters and constants. The question is whether the increase in precision is worth the extra effort of calculation, with diminishing returns. In relation to airways, we think a ternary model for prediction (easy, difficult, and plausibly difficult) may be slightly better than a binary (easy vs difficult) and indeed much of our editorial was about the ‘plausibly difficult’ as potentially a third class in a ternary system [1]. Moreover, in relation to management of the plausibly difficult airway, a strictly binary approach has already been shown to be effective [5]. We doubt that a quaternary or quinternary model will work much better. We already know that to be the case, because sophisticated scoring systems are attempts to create more categories (by score) than binary or ternary, and it is well established that these do not predict well [6].

In other words, if Greenland et al. are saying that for plausibly difficult airways, the ideal is probably a plan tailored to the specific anatomy then we wholeheartedly agree. If on the other hand, Greenland et al. are saying that such a detailed anatomical approach should be applied to all patients (ie, even those judged initially judged plausibly easy) then we fundamentally disagree.

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