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**Understanding 'difficult tracheal intubation' in neonatal anaesthesia**

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Editor - we enjoyed discussing Disma and colleagues' analysis of difficult tracheal intubations in neonates and young infants of up to 60 weeks' postmenstrual age and the accompanying editorial by Jagannathan and Asai,<sup>1,2</sup> at our online journal club based in Manchester, UK. Despite the high incidence of difficult tracheal intubation (5.8%) found in this study, there was no evidence of associated morbidity or mortality, no instances of 'cannot intubate cannot oxygenate', and no cases that required a surgical airway.<sup>1</sup> These findings lead us to consider the implications of the definition of 'difficult tracheal intubation' applied in this study, and whether this was consistent with recent similar studies.

The incidence of difficult tracheal intubation in the general population remains contentious. This is, in part, because there is no universally agreed consensus on its definition. Though recent cohort studies have consistently deemed that > 2 unsuccessful attempts can qualify an intubation as 'difficult', this numerical definition is accompanied by various caveats,<sup>1,3,4</sup> and studies have reported widely varying results (table 1). In Disma and colleagues' study, difficult intubation was defined as that which involved 'more than two unsuccessful attempts of intubation by direct laryngoscopy regardless of Cormack–Lehane grading and requiring alternative strategies or specific intervention'.<sup>1</sup> Notably, neither this definition nor the study protocol incorporates any assessment of the experience (i.e. in neonatal airway management) of the laryngoscopist.<sup>5</sup>

In UK practice, neonatal anaesthesia and surgery typically occurs at specialised centres and care is provided by teams with regular exposure to neonatal practice.<sup>6</sup> However, these specialist centres also act as regional hubs for training and professional development in paediatric anaesthesia. Consequentially, it is not uncommon for airway management to be undertaken by a trainee (or a senior doctor on secondment) in the presence of a consultant with a specialist interest in neonatal anaesthesia, who may choose to permit some unsuccessful attempts at tracheal intubation in a controlled environment before taking over. As such, multiple tracheal intubation attempts may reflect little more than inexperience in an unfamiliar setting, but would qualify as a difficult intubation according to Disma and colleagues' definition.

Although Disma and colleagues' study summarises the interventions employed in the management of difficult tracheal intubation (e.g. change of laryngoscope blade, assistance from a senior colleague),<sup>1</sup> it is not methodologically equipped to reveal why tracheal intubation was so often found to be difficult in this population. As pointed out by Jagannathan and Asai,<sup>2</sup> the tendency for neonates and young infants to undergo rapid oxyhaemoglobin desaturation following the onset of apnoea makes them *physiologically* difficult to intubate (i.e. before desaturation occurs), regardless of anatomical challenges. If precipitous desaturation requiring abandonment of intubation attempts is indeed a major consideration, the suggestion that videolaryngoscopy be more widely used as a primary technique may not substantially improve matters as this approach has not been found to reduce time to intubation in this patient group.<sup>1,2,7</sup> Furthermore, variations in videolaryngoscope blade design may make some devices more suitable than others in this population; Peyton and colleagues' analysis of the Paediatric Difficult Intubation Registry found videolaryngoscopy with a non-standard blade (e.g. hyperangulated), compared with a standard blade (e.g. a Macintosh or Miller type design), was associated with lower rates of successful intubation in patients weighing <5Kg despite there being no significant difference in the quality of glottic

views obtained.<sup>8</sup> This indicates that further work is required to establish the optimal techniques of videolaryngoscopy in this patient population, including the role of apnoeic oxygenation to prevent desaturation.

In their discussion of 'the myth of the difficult airway', Huitink and Bouwman conceptualise airway management as 'a complex situational interplay of patient, practitioner, equipment, expertise and circumstances'.<sup>9</sup> Whilst Disma and colleagues' study helpfully summarises the epidemiology of difficult tracheal intubation amongst neonates and young infants and should give anaesthetists pause for thought, it is difficult to know what best to change on the basis of their findings. Here, case study methodology such as that used by The Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society (NAP4) may yield informative results, however NAP4 included only three case studies relating to the care of infants, likely owing to the comparative rarity of major complications associated with airway management in this population despite the high incidence of difficult tracheal intubation.<sup>1,10</sup>

We commend Disma and colleagues for highlighting the risks associated with airway management in neonatal anaesthetic practice.<sup>1</sup> However, there remains a need to understand in greater granularity the causes of, and potential solutions to, difficult tracheal intubation in this unique patient population.

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## **Declarations of interest**

CLS is a former member of the editorial board of BJA Education. The authors declare no other competing interests.

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**Table 1:** recent large cohort studies of difficult tracheal intubation in anaesthetic practice

| <b>Study</b>                              | <b>Population</b>  | <b>Incidence of difficult tracheal intubation</b> | <b>Criteria for difficult tracheal intubation</b>  |
|---|--|---|--|
| <b>Disma et al (2021)<sup>1</sup></b>     | Neonates and infants < 60 weeks postmenstrual age, 165 centres in 31 European countries, 2016-2017 (n = 4,683) | 5.8%  | > 2 intubation attempts <i>by direct laryngoscopy, and requiring alternative strategies or specific intervention</i> |
| <b>Schroeder et al (2018)<sup>4</sup></b> | Adult patients from one major urban centre and 15 affiliated hospitals, USA, 2009-2015 (n = 528,872)           | 0.15%   | > 2 intubation attempts <i>by an experienced practitioner</i>  |
| <b>Nørskov et al (2014)<sup>5</sup></b>   | Patients from 37 departments of anaesthesia, Denmark, 2008-2011 (n = 182,050)                                  | 1.86%   | > 2 intubation attempts <i>by direct laryngoscopy, or the unplanned use of 'advanced techniques'</i>                 |