Research aimed at predicting difficult tracheal intubation falls into two categories. One is concerned with defining the underlying anatomical problems without necessarily producing a useful clinical test, the other is aimed directly at the clinical need for a simple bedside test that will predict difficult intubation.

As difficult intubation occurs infrequently and is not easy to define, research has been directed at predicting difficult laryngoscopy. This is graded as the amount of larynx seen when a Macintosh laryngoscope is used in a patient with the head and neck in the optimum position. Most research workers have defined “difficult laryngoscopy” as failure to see beyond the epiglottis. It is argued that, if difficult laryngoscopy has been predicted and intubation is essential, skilled assistance and special equipment can be provided.

The pioneer work in the first category of research was carried out by two ENT surgeons, White and Kander [1] using head and neck x-rays. More recently, this work has been repeated, extended and subjected to appropriate statistical analysis by Bellhouse and Dore [2]. Horton, Fahy and Charters [3] have obtained lateral x-rays of the head and neck during laryngoscopy to show the relationship of the laryngoscope blade to the hyoid, and Bucx and colleagues [4] have measured the forces applied during laryngoscopy, relating them to patient factors. The intention of this type of research is to reveal differences that may lead to the design of better clinical predictors of difficulty or improvements in current methods of laryngoscopy. In this issue of the journal, Chou and Wu present x-ray evidence from a small number of patients known to present difficulty in laryngoscopy, relating them to patient factors. The test designed by Wilson and his colleagues [7] found the mento-hyoid distance to be shorter (but, not usefully so) in patients who presented difficulty in laryngoscopy or intubation.

The second category of research is aimed directly at producing a simple bedside test that will reliably predict those patients in whom laryngoscopy may be difficult. The test most widely advocated is that devised by Mallampati and colleagues [8]. Its great merit is simplicity, but those who recommend it completely ignore its unreliability. The principle is simple enough—when the mouth is opened and the tongue protruded, a large or disadvantageously positioned tongue obscures the view of the posterior pharynx and therefore may also obscure the view of the glottis. As many as four grades of pharyngeal view have been described [9], but in practice only the boundary between two is used as the criterion for predicting difficult laryngoscopy. The exact definitions vary slightly between authors, adding to the confusion. The clearest and simplest version is: if you cannot see any of the posterior pharyngeal wall, predict “difficult” [10]. Regrettably, the test performs poorly, and about 50% of the patients who proved to be difficult to laryngoscope were not predicted as such [7, 8, 11–14]. This is no great surprise, as the test has considerable observer variability [11, 15, 16], and does not take head and neck movement into account.

The test designed by Wilson and his colleagues [17] combines into a predictive rule several factors found to be associated with difficult intubation. This test is quick, far simpler to use than might at first appear from the description, and has the advantage of focusing attention on individual factors. When it was used by eight anaesthetists (seven of whom had never used it before), 80% of patients in whom laryngoscopy subsequently proved difficult were identified correctly. Unfortunately, Oates and colleagues [11] reported a much worse performance in a comparative study, finding little to choose between the Mallampati and Wilson tests, with both tests failing to predict as many as 58% of difficult laryngoscopies.

Combinations of various measurements, including some new ones, are being examined in the hope of improving predictive ability. There is no advantage in combining the Wilson and Mallampati tests [18]. A deficiency of many tests is their failure to give due weight to movement at the atlanto-occipital joint [6] and more especially the atlanto-axial gap [19], which is now known to be especially important. Menon [cited in 20] has suggested it can be assessed better by asking the patient to extend the head while their neck is held in full flexion. The thyro-mental distance is potentially useful because it is easy to measure and is influenced by several factors. As a single test it is unreliable [13], but it may work if combined with other tests. Frerk [10] has argued that, if the thyro-mental distance is less than 7 cm and the posterior pharyngeal wall cannot be seen during the Mallampati test, intubation will be difficult. Unfortunately, the majority of difficult intubations thus identified would not have met the criterion for difficult laryngoscopy used by other authors [20], so the case remains unproven. Two recent studies published in abstract, one of 1501 patients [21] and
the other enriched with patients known to be difficult to laryngoscope [22], failed to predict difficult laryngoscopy reliably, despite examining many potential predictors.

The search for improved predictive tests continues, but is beset with difficulties, not the least of which is the decline in the number of tracheal intubations and, consequently, a decline in the number of "difficult patients" studied. As difficult laryngoscopy is a multifactorial problem, many such patients must be studied to ensure the necessary spread of factors. Even quite large studies usually contain a number of suitable patients insufficient to provide acceptable estimates (95% confidence limits) of predictive ability. So, despite claims, there is as yet insufficient evidence to choose between the Mallampati, Wilson and Freerk tests, or any other combination. Finally, any new predictive rule must be tested prospectively on a large sample of new patients, as a test inherently performs well on the data used to create it. This is an important point of experimental design that is usually forgotten or ignored.

Meanwhile, also, anaesthetic techniques have been changing. Fewer patients undergo tracheal intubation, because of the increasing use of the laryngeal mask and regional anaesthetic techniques (especially in obstetrics), and so fewer patients are being put at risk. Fibreoptic intubation is practised widely and other devices have some advocates. More important, the gum elastic bougie is used widely in the U.K. for difficult intubation. The success of this simple tool has quietly but radically altered anaesthetic practice, as all that is now required is a view of the epiglottis:


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REFERENCES