Identification of the difficult airway

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Abstract

Failure to identify a difficult airway can have serious consequences. It is essential that a thorough assessment of a patient's airway is made, including history and a focussed examination. It is known that the reliability of preoperative assessment is disappointing but positive findings will allow for an appropriate airway management plan to be devised in order to minimize airway-related complications. Despite this, situations will still occur where an unexpected difficult airway is encountered.

Keywords Airway; consequences; difficult; investigation; preoperative examination

Royal College of Anaesthetists CPD Matrix: 1C01, 1C02, 2A01, 3A01

Learning objectives

After reading this article, you should be able to:

- recognise the concept of a difficult airway
- describe some of the common causes of a difficult airway
- identify and perform the tests necessary to assess for a difficult airway
- outline further investigations which may be required to assess a patient's airway
- discuss the consequences of a difficult airway

Factors associated with a difficult airway

Congenital syndromes	Chronic conditions	Infections	Other
Alpert syndrome	Rheumatoid arthritis	Supraglottitis	Burns
Pierre Robin syndrome	Ankylosing spondylitis	Epiglottitis	Head/neck malignancy
Treacher Collins syndrome	Acromegaly	Croup	Head/neck irradiation
Klippel–Feil		Abscess	Facial/cervical trauma
		Ludwig's Angina	

Table 1

Anaesthetists are defined by their ability to manage the airway. However in certain situations a difficult airway may be encountered. This is defined as 'an airway in which an experienced anaesthesia provider encounters difficulty with face mask ventilation, difficulty with tracheal intubation, or both'.[1] Additionally, all methods of airway manipulation including using airway adjuncts and supraglottic airway devices (SAD) may fail.

When things do go wrong with airway management the consequences can be severe. The 4th National Audit Project highlighted the requirement for all patients to undergo an adequate airway assessment to identify potential difficulty, and that failure to do so may contribute to a poor outcome.[2]

Assessment of the airway

History

A careful history is of paramount importance. The aim of this is to detect medical, surgical and anaesthetic factors that may indicate a potentially difficult airway (Table 1). This should prompt appropriate examination and investigation. Previous anaesthetic records may immediately alert the anaesthetist to an airway problem; the patient may even carry an airway alert card.

Evidence of particular medical conditions should be sought. A history of rheumatoid arthritis, ankylosing spondylitis, acromegaly and previous head and neck malignancy should be considered as causing potential airway difficulty. Rare syndromes associated with a difficult airway exist, including Alpert, Pierre Robin, Klippel–Feil, and Treacher Collins. Acute acquired pathology such as facial trauma, burns, thermal injury or head and neck infection/carcinoma should alert the anaesthetist to the possibility of increased difficulty in managing the airway.

Symptoms

One of the principal difficulties in predicting airway problems under anaesthesia is that in many unexpected cases there are no symptoms. However, there are still certain symptoms that should alert the anaesthetist to potential problems.

A history of obstructive sleep apnoea (OSA) should be sought as this is positively correlated with difficult mask ventilation and intubation.[3] Symptoms suggestive of OSA include snoring and daytime lethargy. OSA is more common in patients who are male, have a body mass index over 35, are aged over 50 years and have a neck circumference greater than 40 cm.

In the presence of pre-existing airway pathology, symptoms suggestive of impending airway obstruction should be identified. These include the presence of stridor, hoarseness, voice change, dysphagia and difficulty lying flat.

In cases of airway trauma it is important to elicit the presence of swelling, pain and trismus as this will influence management and swelling is likely to worsen over time.

Examination

A general examination looking for obesity, presence of a beard, large breasts and obvious external signs of head and neck

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pathology is easily done at the bedside. All of these signs indicate that airway management may be more challenging.

There is no one reliable test for airway assessment and this is well documented. However, there are a number of different tests which, when used together, can be useful to guide airway management. These are detailed below.

Specific areas of examination

Dental health should be examined and patients warned of possible damage to loose, restored or diseased teeth.

Mouth opening ability is vital for most airway interventions. This is measured as the inter-incisor distance. A distance of less than 3 cm is a cause for concern. However, it should be noted that some newer videolaryngoscope blades require only 2 cm for insertion. Assessment is usually by 'eye', but should be formally measured when restriction is noted.

The Mallampati classification is commonly used and is based on the structures identified with maximal mouth opening and tongue protrusion in the seated patient. A score of 1–4 is applied depending on the anatomical structures visualized (Figure 1). Scores of 3 and 4 are associated with difficulty in mask ventilation and difficult laryngoscopy. However, the Mallampati classification has serious inter-observer variability and poor sensitivity and specificity (50% and 75% respectively), meaning that about half of the true positives are missed and about one-quarter of 'easy' patients are falsely identified as difficult. As most patients in the surgical population are 'easy' (about 2–5% are grade 3 laryngoscopy) the positive predictive value of the test is about 10–20% (about one in ten positive tests proves to be correct).

Thyromental distance (TMD) is a measurement between the thyroid prominence and the tip of the jaw when the head and neck are fully extended and the mouth closed (Figure 2). During direct laryngoscopy the tongue is displaced into the space quantified by the thyromental distance. If the TMD is less than 6 cm, there is less space for tongue compression by the laryngoscope blade, meaning visualization of the laryngeal inlet may be difficult. For accuracy this distance is best measured with a ruler or measuring tape. Unfortunately the positive predictive value is worse than for Mallampati.

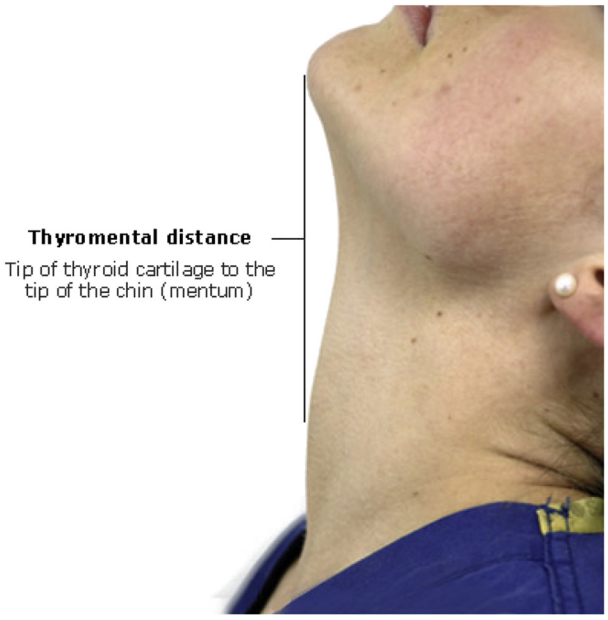

Figure 2 Thyromental distance.

Thyromental height (TMHT) is the distance measured between the anterior borders of the mentum and thyroid cartilage when the patient is lying flat with the mouth closed. Less than 50 mm is non-reassuring. TMHT is potentially more accurate in

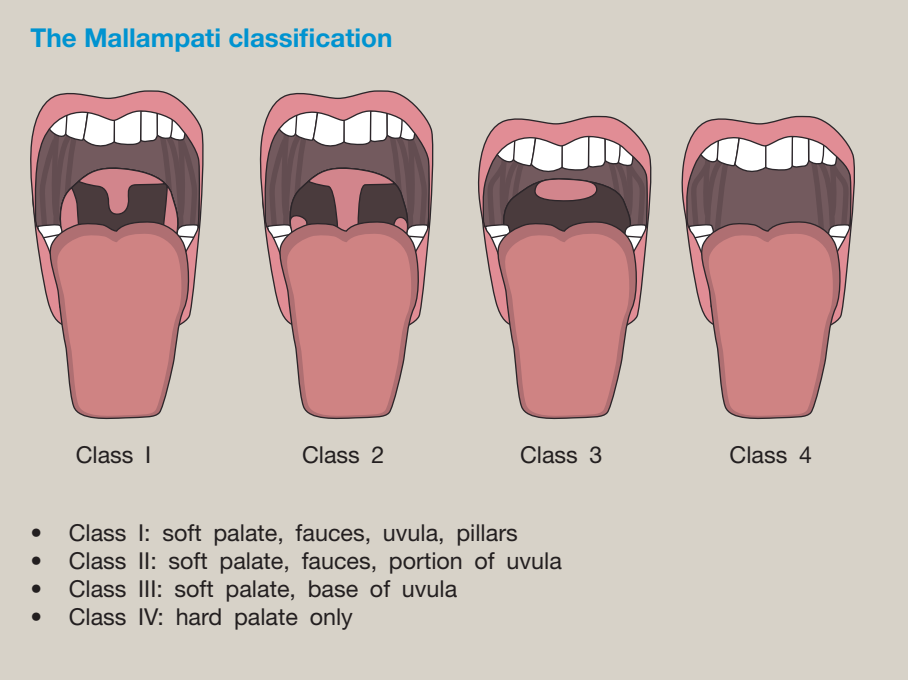

Figure 1

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