Should we still be using gender as a basis for endotracheal tube selection?

Intubating a patient is one of the core skills that anaesthetists learn. The 4th national audit project (NAP 4) undertaken by the Royal College of Anaesthetists in 2011 showed that of the 2.9 million general anaesthetics taking place annually in the UK 38% (1.1 million) involve use of an endotracheal tube (Cook et al, 2011). Traditionally anaesthetists have been taught to choose the size of endotracheal tube depending on the patient's gender, with sizes varying from 8.0–9.0 mm for an average-sized man, and 7.0–8.0 mm for a woman. This begs the question – what is an average-sized man or woman? And when intubating for routine anaesthesia, is there a better system for sizing an endotracheal tube than this?

Why should we no longer use gender?

A 2012 editorial in *Anaesthesia* (Farrow et al, 2012) discussed the issue of choosing the correct size of endotracheal tube. It highlighted that the incidence of sore throat after tracheal intubation varies from 14–50%, with smaller tubes causing fewer sore throats than larger ones. There is also an association between use of larger tubes and glottic and tracheal damage, especially in women. Instead of accepting side effects in adults, should anaesthetists not be actively aiming to reduce patient discomfort where possible and altering practice accordingly? And if so, what evidence is there to justify the criteria to use?

In the paediatric population a recognized systematic, weight-based approach is already used to help guide the choice of endotracheal tube. Studies have consistently shown that there is a good correlation between body length and tracheal diameter in adults, with Griscom and Wohl demonstrating this as far back as 1985. In 2011, an American study showed that patient height correlated significantly with the coronal subcricoid tracheal diameter as well as with the distance between lower incisors and cricoid cartilage in adults. They found no statistically significant gender or age-related correlation (Coordes et al, 2011).

Interestingly, another more recent study looking at associations between cervical cross-sectional area on computed tomography scan and clinical variables concluded that selection of endotracheal tube size correlates well with height, but that gender was also an important factor in tube selection (Karmakar et al, 2015). Coordes et al (2011) proposed a height-based nomogram should be investigated and developed for evidence-based tube selection and placement.

Why should we still use gender?

Basing endotracheal tube choice for adults on gender is a simple, easy method of determining tube size. Having a generic formula available when intubating reduces uncertainty, especially in emergency situations. Anaesthetic assistants are also familiar with the system, allowing for coordinated teamwork. Karmakar et al (2015) suggested that it may be appropriate to select a uniformly smaller diameter endotracheal tube for women, so it may be that both gender and height need to be considered for female patients.

A survey of 42 anaesthetists from the Head and Neck Anaesthetic Group of London found that gender and height were the most common criteria used to size endotracheal tubes (28.6% and 26.2% respectively) with 38% using an unspecified combination of factors (unpublished data, S Saha et al, 2012).

Arguably, if head and neck anaesthetists do not have defined criteria for tube selection, and the incidence of long-term complications of intubation is rare (during routine anaesthesia), why should a time-honoured system that is apparently serving us well be altered?

Discussion

Although long-term morbidity associated with endotracheal intubation is rare, patients can often suffer minor complications after anaesthesia using an endotracheal tube. Arbitrarily using an endotracheal tube size based on the patient's gender is not optimal or evidence based, and can contribute to postoperative patient discomfort. Karmakar et al (2015) suggested that, especially for women, potentially a combination of both gender and height should be considered. Given the evident correlation between a person's height and tracheal diameter, surely it is time to develop a clear algorithm based on height and endotracheal tube size, and alter practice to use the most clinically appropriate endotracheal tube during routine anaesthesia? **BJHM**

Cook TM, Woodall N, Frerk C; Fourth National Audit Project (2011) 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. *Br J Anaesth* **106**(5): 617–631. https://doi.org/10.1093/bja/aer058

Coordes A, Rademacher G, Knopke S, Todt I, Ernst A, Estel B, Seidl RO (2011) Selection and placement of oral ventilation tubes based on tracheal morphometry. *Laryngoscope* **121**(6): 1225–1230. https://doi.org/10.1002/lary.21752

Farrow S, Farrow C, Soni N (2012) Size matters: choosing the right tracheal tube. *Anaesthesia* **67**: 815–819. https://doi.org/10.1111/j.1365-2044.2012.07250.x

Griscom NT, Wohl ME (1985) Dimensions of the growing trachea related to body height. Length, anteroposterior and transverse diameters, cross-sectional area, and volume in subjects younger than 20 years of age. *Am Rev Respir Dis* **131**(6): 840–844. https://doi.org/10.1164/arrd.1985.131.6.840

Karmakar A, Pate MB, Solowski NL, Postma GN, Weinberger PM (2015) Tracheal size variability is associated with sex: implications for endotracheal tube selection. *Ann Otol Rhinol Laryngol* **124**(2): 132–136. https://doi.org/10.1177/0003489414549154

Dr Kate Sherratt, Locum Consultant Anaesthetist, Department of Anaesthetics, Royal Free Hospital, London NW3 2QG

Dr Catriona Ferguson, Consultant Anaesthetist, Department of Anaesthetics, Royal National Throat, Nose and Ear Hospital, London

Correspondence to: Dr K Sherratt (kmsherratt@doctors.net.uk)

Anaesthetic and critical care dilemmas are coordinated by **Dr Rob Anker**, Anaesthetic Registrar (ST6), Royal Marsden Hospital, London and **Dr Prashanth Nandhabalan**, Specialist Registrar in Anaesthesia and Intensive Care, King's College Hospital NHS Foundation Trust, London