Correct knowledge of airway anatomy in infants is fundamental to any procedure requiring instrumentation of the airway.

Funnel-shaped concept of pediatric airway has been challenged.

Current consensus from available literature is that airway is elliptical in shape with subglottis representing narrowest dimension with no decrease in cross-sectional area at the cricoid. Past research has relied on anatomical or cadaveric specimens to describe the shape of the pediatric airway. Recent research has been based on videobronchoscopy, CT and MRI imaging. CT imaging allows for precise measurements as it delineates the air-tissue interface better than other imaging modalities.

Present study used 2-dimensional CT images to determine airway shape and dimensions in neonates and infants as well as dimensional transition between subglottic area and cricoid ring.

Background

Database search of electronic medical records identified 273 patients of whom 40 qualified for the current study.

Spontaneous ventilation with native airway was maintained throughout radiographic imaging.

Subglottic level was defined as the CT imaging slice with a flattened posterior wall. Scans were obtained during either natural sleep or with sedation and spontaneous ventilation without airway devices in place.

An increase in transverse dimension was observed from subglottis to cricoid (5.3 ± 0.84 mm v/s 6.1 ± 0.86 mm), whereas AP dimensions showed a decrease from subglottis to the cricoid (7.2 ± 0.87 mm v/s 6.7 ± 0.75 mm).

Statistically significant difference was observed between transverse and AP diameters at level of the subglottis and the cricoid (P=0.000) (Table 1).

Ratio between transverse and AP diameters at the subglottis was 0.74 at subglottis and 0.89 at the cricoid.

Mean cross sectional area at two levels were similar, 29.9 ± 7.5 mm² at the subglottis and 32.1 ± 7.8 mm² at the cricoid.

AP dimension was greater than transverse dimension (P=0.000), at subglottis as well as cricoid hence resembling an ellipse at both levels of the airway (Table 2).

Airway in neonates and infants is narrower in its transverse dimension compared to AP dimension from subglottis to cricoid. This is different from older children (≥ 1 year of age) where airway assumes a circular shape level of cricoid.

Elliptical shape at subglottic level provides an anatomical explanation that an uncuffed ETT may exert pressure on lateral walls while still allowing an air leak anteroposteriorly. Hence a cuffed ETT may be a better choice in this population as an uncuffed endotracheal tube may allow an air leak anteroposteriorly. Hence a cuffed ETT may be a better choice in this population as an uncuffed endotracheal tube may allow an air leak anteroposteriorly.

Fixed cartilaginous dimensions of the cricoid ring are unable to expand when contacted by a rigid airway device, whereas the subglottic area may be stretched with potential lower risk of relevant harm.

Airway in neonates and infants is narrower in its transverse dimension compared to AP dimension from subglottis to cricoid. This is different from older children (≥ 1 year of age) where airway assumes a circular shape level of cricoid.

Elliptical shape at subglottic level provides an anatomical explanation that an uncuffed ETT may exert pressure on lateral walls while still allowing an air leak anteroposteriorly. Hence a cuffed ETT may be a better choice in this population as an uncuffed endotracheal tube may allow an air leak anteroposteriorly. Hence a cuffed ETT may be a better choice in this population as an uncuffed endotracheal tube may allow an air leak anteroposteriorly.

Fixed cartilaginous dimensions of the cricoid ring are unable to expand when contacted by a rigid airway device, whereas the subglottic area may be stretched with potential lower risk of relevant harm.

References


Introduction

Correct knowledge of airway anatomy in infants is fundamental to any procedure requiring instrumentation of the airway.

Funnel-shaped concept of pediatric airway has been challenged.

Current consensus from available literature is that airway is elliptical in shape with subglottis representing narrowest dimension with no decrease in cross-sectional area at the cricoid. Past research has relied on anatomical or cadaveric specimens to describe the shape of the pediatric airway. Recent research has been based on videobronchoscopy, CT and MRI imaging. CT imaging allows for precise measurements as it delineates the air-tissue interface better than other imaging modalities.

Present study used 2-dimensional CT images to determine airway shape and dimensions in neonates and infants as well as dimensional transition between subglottic area and cricoid ring.

Background

Database search of electronic medical records identified 273 patients of whom 40 qualified for the current study.

Spontaneous ventilation with native airway was maintained throughout radiographic imaging.

Subglottic level was defined as the CT imaging slice with a flattened posterior wall. Scans were obtained during either natural sleep or with sedation and spontaneous ventilation without airway devices in place.

An increase in transverse dimension was observed from subglottis to cricoid (5.3 ± 0.84 mm v/s 6.1 ± 0.86 mm), whereas AP dimensions showed a decrease from subglottis to the cricoid (7.2 ± 0.87 mm v/s 6.7 ± 0.75 mm).

Statistically significant difference was observed between transverse and AP diameters at level of the subglottis and the cricoid (P=0.000) (Table 1).

Ratio between transverse and AP diameters at the subglottis was 0.74 at subglottis and 0.89 at the cricoid.

Mean cross sectional area at two levels were similar, 29.9 ± 7.5 mm² at the subglottis and 32.1 ± 7.8 mm² at the cricoid.

AP dimension was greater than transverse dimension (P=0.000), at subglottis as well as cricoid hence resembling an ellipse at both levels of the airway (Table 2).

Airway in neonates and infants is narrower in its transverse dimension compared to AP dimension from subglottis to cricoid. This is different from older children (≥ 1 year of age) where airway assumes a circular shape level of cricoid.

Elliptical shape at subglottic level provides an anatomical explanation that an uncuffed ETT may exert pressure on lateral walls while still allowing an air leak anteroposteriorly. Hence a cuffed ETT may be a better choice in this population as an uncuffed endotracheal tube may allow an air leak anteroposteriorly. Hence a cuffed ETT may be a better choice in this population as an uncuffed endotracheal tube may allow an air leak anteroposteriorly.

Fixed cartilaginous dimensions of the cricoid ring are unable to expand when contacted by a rigid airway device, whereas the subglottic area may be stretched with potential lower risk of relevant harm.

Airway in neonates and infants is narrower in its transverse dimension compared to AP dimension from subglottis to cricoid. This is different from older children (≥ 1 year of age) where airway assumes a circular shape level of cricoid.

Elliptical shape at subglottic level provides an anatomical explanation that an uncuffed ETT may exert pressure on lateral walls while still allowing an air leak anteroposteriorly. Hence a cuffed ETT may be a better choice in this population as an uncuffed endotracheal tube may allow an air leak anteroposteriorly. Hence a cuffed ETT may be a better choice in this population as an uncuffed endotracheal tube may allow an air leak anteroposteriorly.

Fixed cartilaginous dimensions of the cricoid ring are unable to expand when contacted by a rigid airway device, whereas the subglottic area may be stretched with potential lower risk of relevant harm.

References