Which is not true?

• It may be safe to use an LMA for GA LUSCS
• It may be safe to use a cuffed ETT in a 1 year old
• It may be safe to use spinal anaesthesia if INR 1.5
Cuffed ETT in Paediatrics
Cuffed ETT in Paediatrics

• Why have we used uncuffed tubes historically?
• What is the evidence and reason behind this?
• Why might Cuffed ETT actually be safe and indicated in paediatrics?

• Features of a suitable cuffed Paediatric ETT.
Why do we use uncuffed ETT in children?

• No Need (Cricoid)
• Risk (stridor, subglottic stenosis)
• Cuff necessitates decr size ETT (harder to ventilate/work of breathing, suctioning)
• Appropriately sized/designed cuffed ETT not available.
• Its been the conventional wisdom....
What is the anatomical basis?

- Cadaver studies: cricoid narrowest part
What is the anatomical basis?

• Cadaver studies: cricoid narrowest part

Wrong:
What is the anatomical basis?

• Cadaver studies: cricoid narrowest part

Wrong:

• MRI studies (2003): Unparalysed sedated children. Narrowest elliptical immediately below cricoid
What is the anatomical basis?

• Cadaver studies: cricoid narrowest part

Wrong:

• MRI studies (2003): Unparalysed sedated children. Narrowest elliptical immediately below cricoid

An uncuffed tube can be too big and still result in a large leak at 20cmH2O
Pathophysiology of subglottic stenosis:

- Local ischaemia.... ulceration... Collagen scar...
- Contraction
- Paediatric mucosal perfusion pressure lower.
- Risk areas: inner surface of cricoid
Pathophysiology of subglottic stenosis:

Risk factors:

• Longer intubations (25 days or more)
• Repeated intubations
• Excessive movement of patient
• Comorbidities (sepsis, chronic illness esp inflammatory conditions)
Pathophysiology of subglottic stenosis:

• Incidence 0-8% in prolonged intubation
• (even a large series of 3000 without a single case, hence other factors apart from duration play a part)
What is the evidence for cuffed tubes being higher risk?

• Case reports. (recent as 2004)
• Cases reported more by intensivists: long term ETT

• No studies demonstrate increased airway morbidity (1997 RCT)
• Large published series: (1994 & 2004) specialist institutions routinely using cuffed tubes. No demonstrated increased airway morbidity
Prospective randomized controlled multi-centre trial of cuffed or uncuffed endotracheal tubes in small children

M. Weiss¹, A. Dullenkopf¹, J. E. Fischer², C. Keller³, A. C. Gerber¹ and the European Paediatric Endotracheal Intubation Study Group

¹Department of Anaesthesia, University Children’s Hospital Zurich, Steinwiessstrasse 75, CH 8032 Zurich, Switzerland. ²Mannheim Institute of Public Health, University of Heidelberg, Germany. ³Department of Anaesthesia, Schultess Clinic, Zurich, Switzerland

*Corresponding author. E-mail: markus.weiss@kispi.uzh.ch
Weiss et al.

- Prospective Multicenter RCCT
- Newborns – 5 years age (highest risk for croup)
- Requiring general anaesthesia with plan to extubate postop.
Weiss et al.

• Measured postop stridor & repeat laryngoscopies
• Observers blinded.
• 2406 (Plan to enroll 3928. Prematurely halted.)

• Specific ETT: Microcuff (Kimberley-Clark)
• Cuff pressure limited to 20cmH2O
Results

Stridor

• 4.4% in cuffed
• 4.7% uncuffed

(NB power analysis for rate of 2.5%)
Results

Repeat laryngoscopies/ Intubations
- 2.1% in cuffed
- 30.8% uncuffed

Surrogate outcome: A risk factor for subglottic stenosis (actual incidence not measured in this trial.)
Results

Stridor rates don’t differ if exclude patients with more tube changes.
Results

Capnography “Reliable” in:
• 98.6% cuffed
• 95.6% uncuffed

(Statistically significant. Clinical significance?)
Results

This study does not show that routinely using a cuffed tube is safer:

• For the outcomes measured.
• For other outcomes.
How might the uncuffed ETT actually cause trauma?

• Repeat Laryngoscopies: high tube exchange rate.

• Position in elliptical subglottic region: tends to sit at back of larynx and cause local pressure.
How may cuffed ETT actually decrease airway trauma?

- “Size down” the tube.
- Cuff may lift PVC tip and shaft away from mucosa
- “Just seal” evenly causes pressure by cuff
- Adjustable seal decreases number of repeat intubations
- Tracheal "seal" allows some distension. (U shaped tracheal cartilages. Less pressure as can expand.
- Cuff minimizes tube movement
Summary:

Cuffed ETT are safe in terms of airway morbidity. (At least equivalent to uncuffed)

So long as:

1. Appropriately designed ETT
2. Cuff pressure < 20cmH2O

ie: increased **cost** and **effort**
What are the Indications?

(Soc Paed Anaesthetists)
Prefer a cuffed tube if:

• Aspiration risk
• Decr lung compliance (incl laparoscopy, thoracoscopy)
• Where precise ventilation for CO2 control and measurement required

Down to 4.0 cuffed ETT suitable
(smaller: may get harder to ventilate, or block)
**MICROCUFF™ Endotracheal Tube** is designed for the pediatric anatomical cuff placement.

- Short, cylindrical cuff placed near the tracheal tube tip, securing cuff placement in the trachea, not in the pressure-sensitive larynx.
- Anatomically-based intubation depth mark results in correct placement and a cuff-free subglottic zone.
- Four precision bands to facilitate and confirm optimal tube placement.

**MICROCUFF™ tube is designed for pediatric airway**
Microcuff Paediatric Endotracheal Tube.

HiLo cuff
• Ultrathin PVC.
• Fewer longitudinal folds.
• Very short
• Seal at significantly lower pressures (11cmH2O cf 25 or so)

Cuff free subglottic shaft

Ext depth markings (validated in trials)
Questions:

• None of this may be relevant to ICU type patients/

• Who do we intubate at LRH? Are there indications for cuffed ETT?

• What about PETS? Air retrievals?