Pediatric Difficult Airway Management in the Emergency Department

Evidence-informed strategies, rescue pathways, and teaching for mastery

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Learning Objectives & Competencies

- Anticipate a difficult airway using PED-relevant predictors
- Optimize preoxygenation and minimize apnea-time
- Select first-line devices (VL, SGA, bougie) for context
- Escalate through CV/CI pathways with clear attempt limits
- Apply checklists/bundles to improve first-pass success
- Use simulation and cognitive aids to build durable skills

PED Epidemiology & Risk

- Pediatric ED intubations are infrequent → skill decay risk
- Higher adverse event rates vs adults during RSI
- First-pass success is the critical safety surrogate
- Adverse events cluster with multiple attempts and prolonged apnea
- Adopt attempt limits and explicit triggers to pivot strategy

Rapid Recognition: Pediatric Assessment Triangle (PAT)

- Appearance • Work of breathing • Circulation to skin
- Drives urgency and initial airway/oxygen decisions in seconds
- Validated for triage; instruction improves performance
- Use as pre-RSI shared mental model with the team

Predicting Difficulty (PED-adapted)

BVM: MOANS (Mask, Obesity/Obstruction, Age tone, No teeth, Stiff/Snoring)

DL: LEMON (Look, 3-3-2 (child's fingers), Mallampati limits, Obstruction, Neck)

SGA: RODS (Restricted opening, Obesity/Obstruction, Distorted anatomy, Stiff)

FONA: SMART (Surgery, Mass, Access, Radiation, Tumor)

Document findings; link them to a concrete plan A/B/C

BOX 1-2

MOANS Mnemonic for Evaluation of Difficult Bag-Mask Ventilation

*M*ask seal

*O*bstruction or obesity

*A*ged

*N*o teeth

*S*tiffness (resistance to ventilation)

Adapted with permission from The Difficult Airway Course: Emergency and Walls RM, Murphy MF, eds. Manual of Emergency Airway Management, 4th ed. Philadelphia: Lippincott, Williams & Wilkins; 2012.

Aster

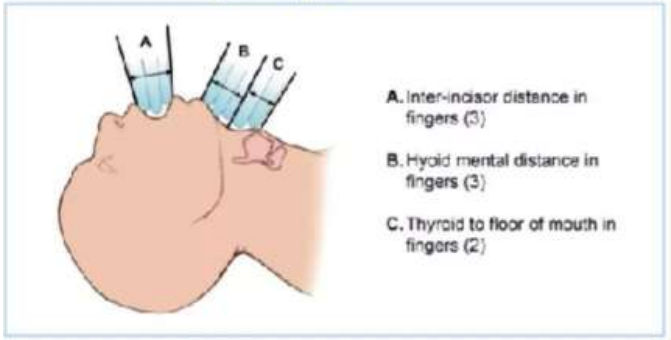


FIGURE 14.6 LEMON airway assessment method. [Murphy MF, Wall RM. The difficult and failed airway. In *Manual of Emergency Airway Management*. Chicago, IL: Lippincott Williams and Wilkins; 2000:31–35.]

Source: Hung OR, Murphy MF: *Management of the Difficult and Failed Airway, 2nd Edition*; www.accessanesthesiology.com

BOX 1-1

LEMON Approach for Evaluation of Difficult Direct Laryngoscopy

*L*ook externally for signs of difficult intubation (by gestalt)

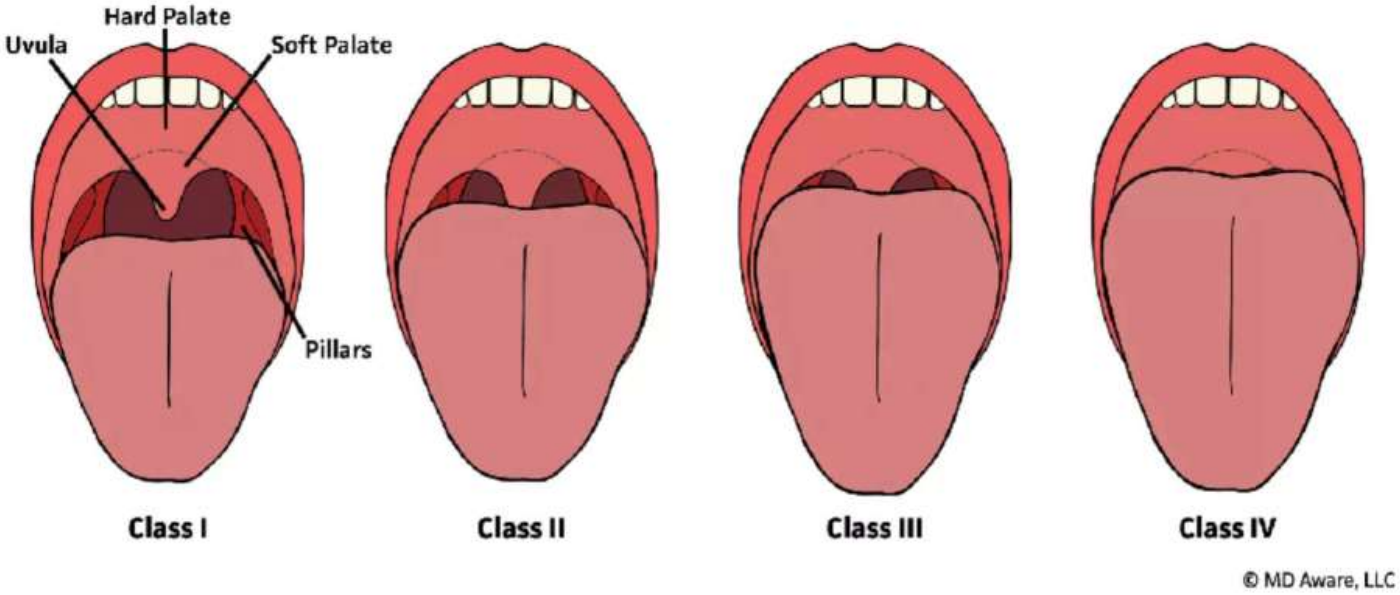
*E*valuate the "3-3-2 rule"

*M*allampati

*O*bstruction or *o*besity

*N*eck mobility

Adapted with permission from The Difficult Airway Course: Emergency and Walls RM, Murphy MF (eds). Manual of Emergency Airway Management, 4th ed. Philadelphia: Lippincott, Williams & Wilkins; 201



SIGNIFICANCE OF MMP SCORE

- Class III or IV: signifies that the angle between the base of tongue and laryngeal inlet is more acute and not conducive for easy laryngoscopy
- Limitations
  – Poor interobserver reliability – Limited accuracy
- Good predictor in pregnancy, obesity, acromegaly

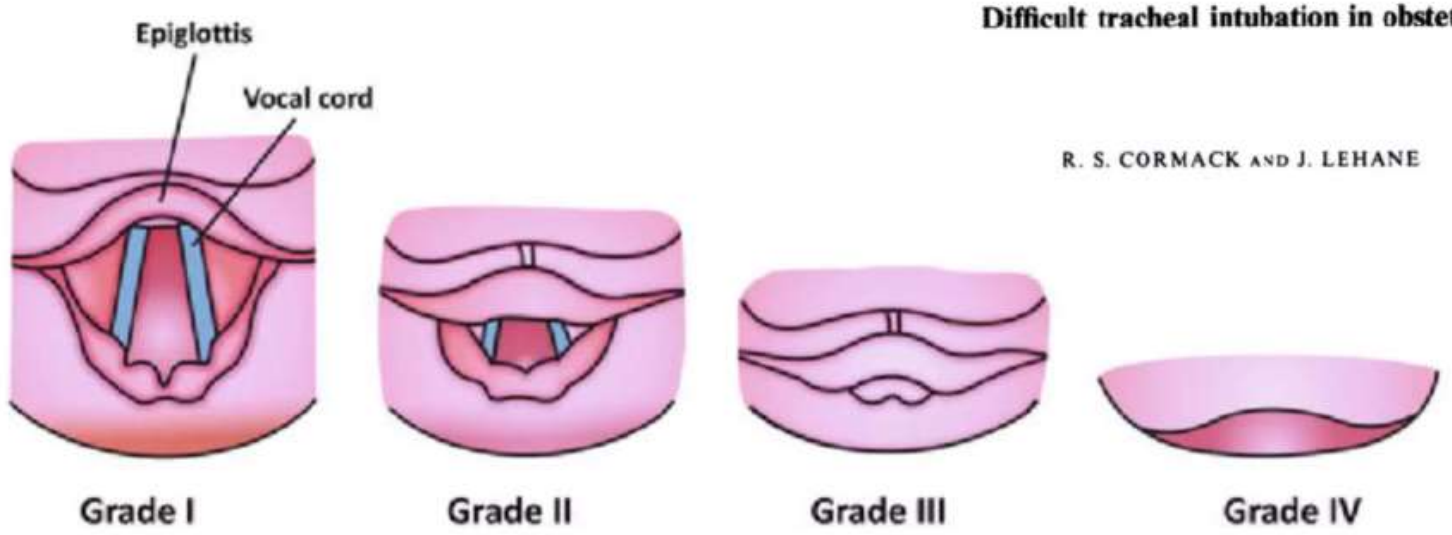
Aster

CL -Classification

Anaesthesia, 1984, Volume 39, pages 1105–1111

Difficult tracheal intubation in obstetrics

R. S. CORMACK AND J. LEHANE



Positioning & Preoxygenation

- Infants: shoulder roll; neutral/slight sniff; jaw support
- Older child: ear-to-sternal-notch alignment (‘ramp’)
- Preoxygenate: NRB + PEEP valve or NIV when feasible
- Apneic oxygenation: standard nasal cannula or HFNC
- Two-person BVM with adjuncts (OPA/NPA) as default

Device Strategy: Video vs Direct Laryngoscopy

- VL enables shared view and improved glottic visualization
- Evidence suggests higher first-pass success with VL in many settings
- Hyperangulated blades require pre-shaped stylet (≈60–90°)
- If hang-up at cords: withdraw stylet slightly; rotate tube 90° CCW
- Limit DL persistence; switch to VL early in difficult views

GLIDESCOPE

Bougie & SGA: High-yield Adjuncts

- Bougie for anterior/partial view; feel tracheal ‘clicks’
- Advance to mid-trachea; railroad ETT; gentle removal
- SGA (LMA/i-Gel) buys oxygenation without cords passage
- Weight-based sizing; anticipate leaks & displacement
- Intubating LMA/fiberoptic as bridge when available

Gum elastic bougie

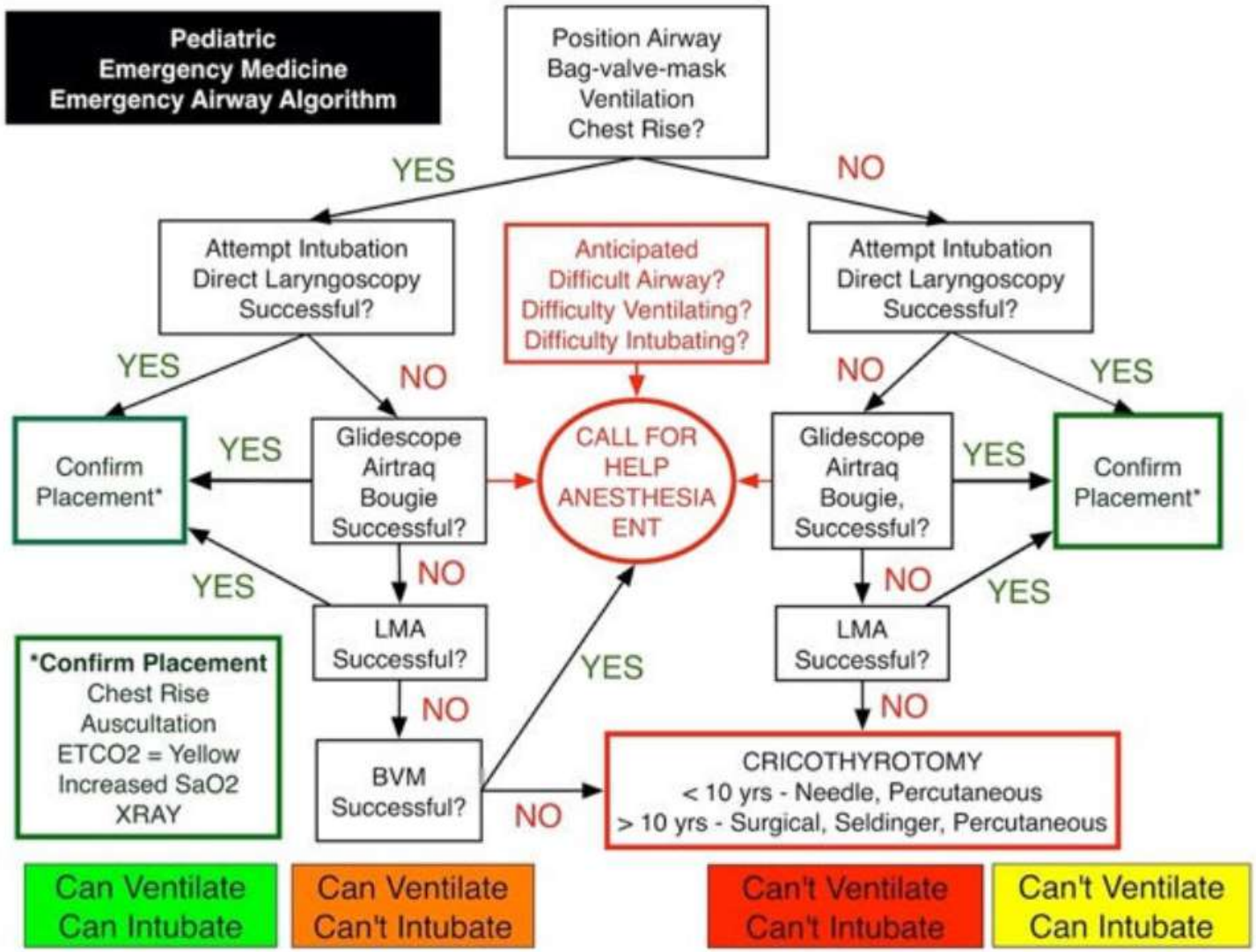
Asl

Attempt Limits & Escalation Cues

- Define ‘attempt’ and time-box it (e.g., ≤30–45 seconds)
- Hard stop after 2 failed attempts → change operator/device
- Oxygenation first: re-preoxygenate between attempts
- Announce pivot points aloud to the team (‘Switch to SGA’)

Rescue Pathway: Can Ventilate, Can’t Intubate

- Maintain oxygenation via BVM/SGA while re-planning
- Optimize with VL + bougie; external laryngeal manipulation
- Consider intubating LMA or flexible scope
- Upper airway obstruction: SGA may fail as edema progresses


Pediatric
Emergency Medicine
Emergency Airway Algorithm
Position Airway
Bag-valve-mask
Ventilation
Chest Rise?
YES
NO
Attempt Intubation
Direct Laryngoscopy
Successful?
Anticipated
Difficult Airway?
Difficulty Ventilating?
Difficulty Intubating?
Attempt Intubation
Direct Laryngoscopy
Successful?
YES
NO
NO
YES
Confirm
Placement*
YES
Glidescope
Airtraq
Bougie
Successful?
CALL FOR
HELP
ANESTHESIA
ENT
Glidescope
Airtraq
Bougie,
Successful?
YES
Confirm
Placement*
YES
NO
NO
YES
LMA
Successful?
LMA
Successful?
*Confirm Placement
Chest Rise
Auscultation
ETCO2 = Yellow
Increased SaO2
XRAY
NO
NO
YES
BVM
Successful?
CRICOTHYROTOMY
< 10 yrs - Needle, Percutaneous
> 10 yrs - Surgical, Seldinger, Percutaneous
NO
Can Ventilate
Can Intubate
Can Ventilate
Can't Intubate
Can't Ventilate
Can't Intubate
Can't Ventilate
Can Intubate

Rescue Pathway: Can’t Ventilate, Can’t Intubate (CVCI)

- Most experienced operator attempts VL immediately
- Bougie if partial epiglottic view only
- If BVM/SGA/VL fail → front-of-neck access (FONA)
- Prepare landmarks/kits early when SMART flags present

Special Populations

- Infants & craniofacial anomalies: anticipate VL and SGA backup
- Trauma/C-spine: limited extension—optimize VL trajectory
- Obesity/OSA: PEEP and ramping; consider early SGA
- Infectious obstruction (epiglottitis, RPA): SGA may be unreliable

Medication Strategy in Anticipated Difficulty (brief)

1

Prioritize oxygenation; avoid hypotension and prolonged apnea

2

Choose induction agents supporting hemodynamics (e.g., ketamine)

3

Use long-acting paralytic (rocuronium) to facilitate VL/bougie plan

4

Consider delayed sequence intubation when agitation impedes preoxygenation

Quality Improvement: Checklists & Bundles

Airway safety bundles reduce adverse events over time

Checklists improve first-pass success and prevent hypoxemia

Translational simulation boosts bundle adherence

Adopt a PED-specific bundle (NEAR4PEM work ongoing)