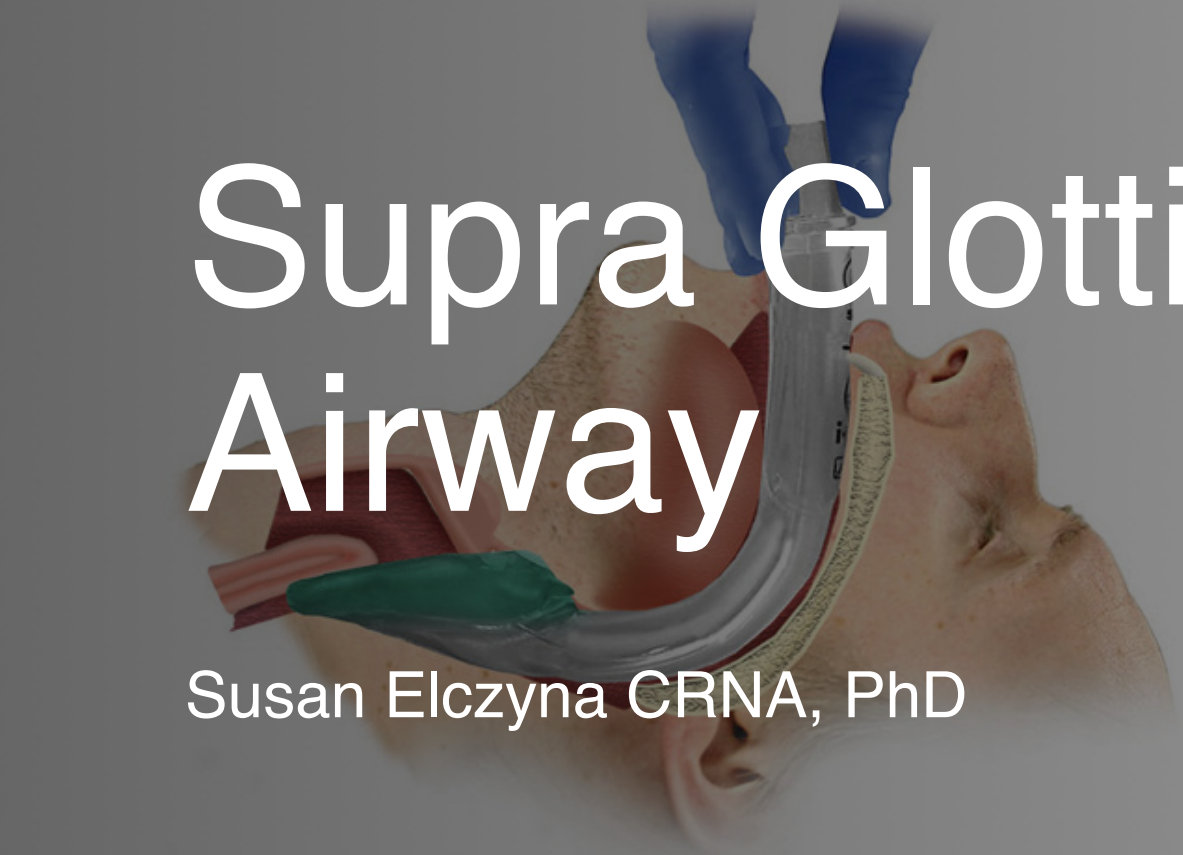
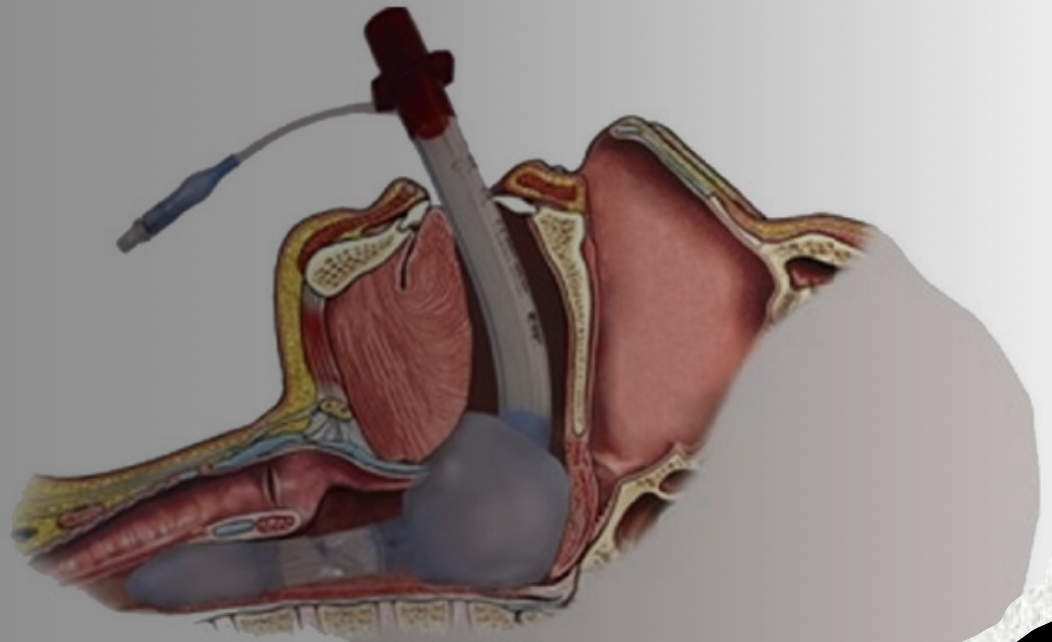
A: i-gel™ Laryngeal mask airway

B: King LT - D



Supra Glottic Airway



Susan Elczyna CRNA, PhD

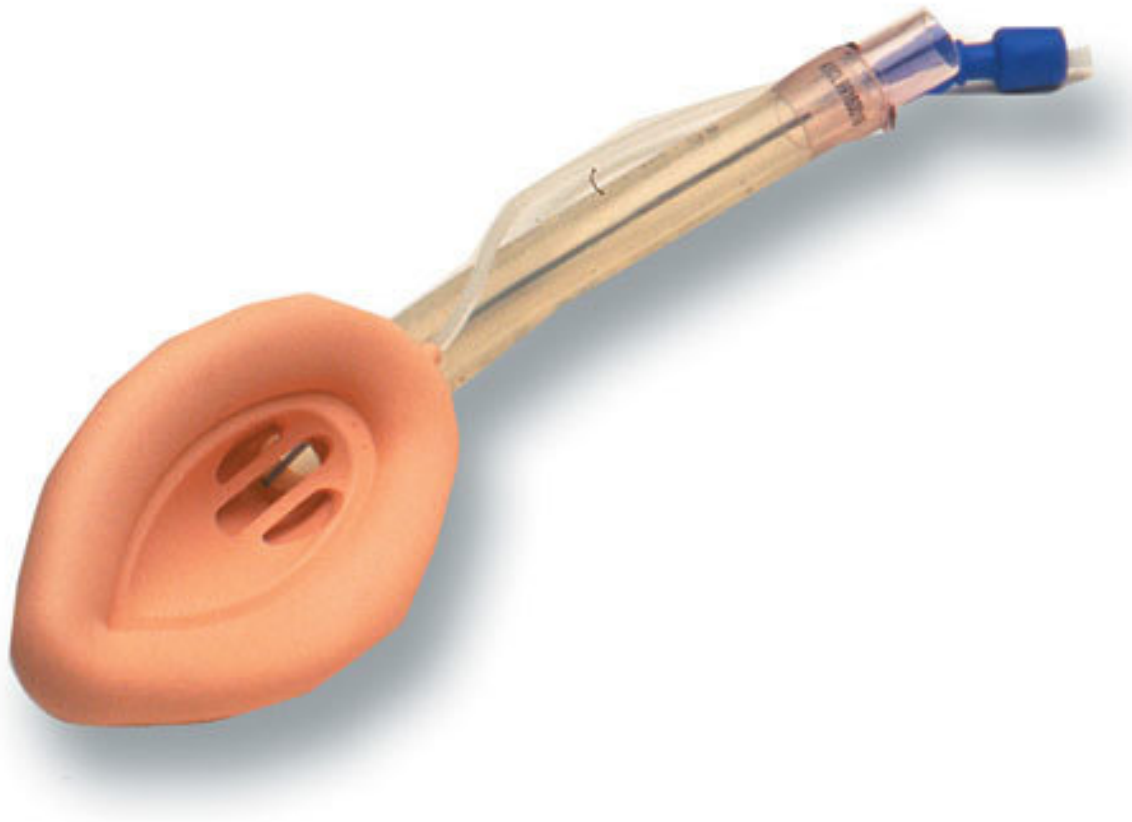

Conflict
of Interest

ETI vs SGA

LMA

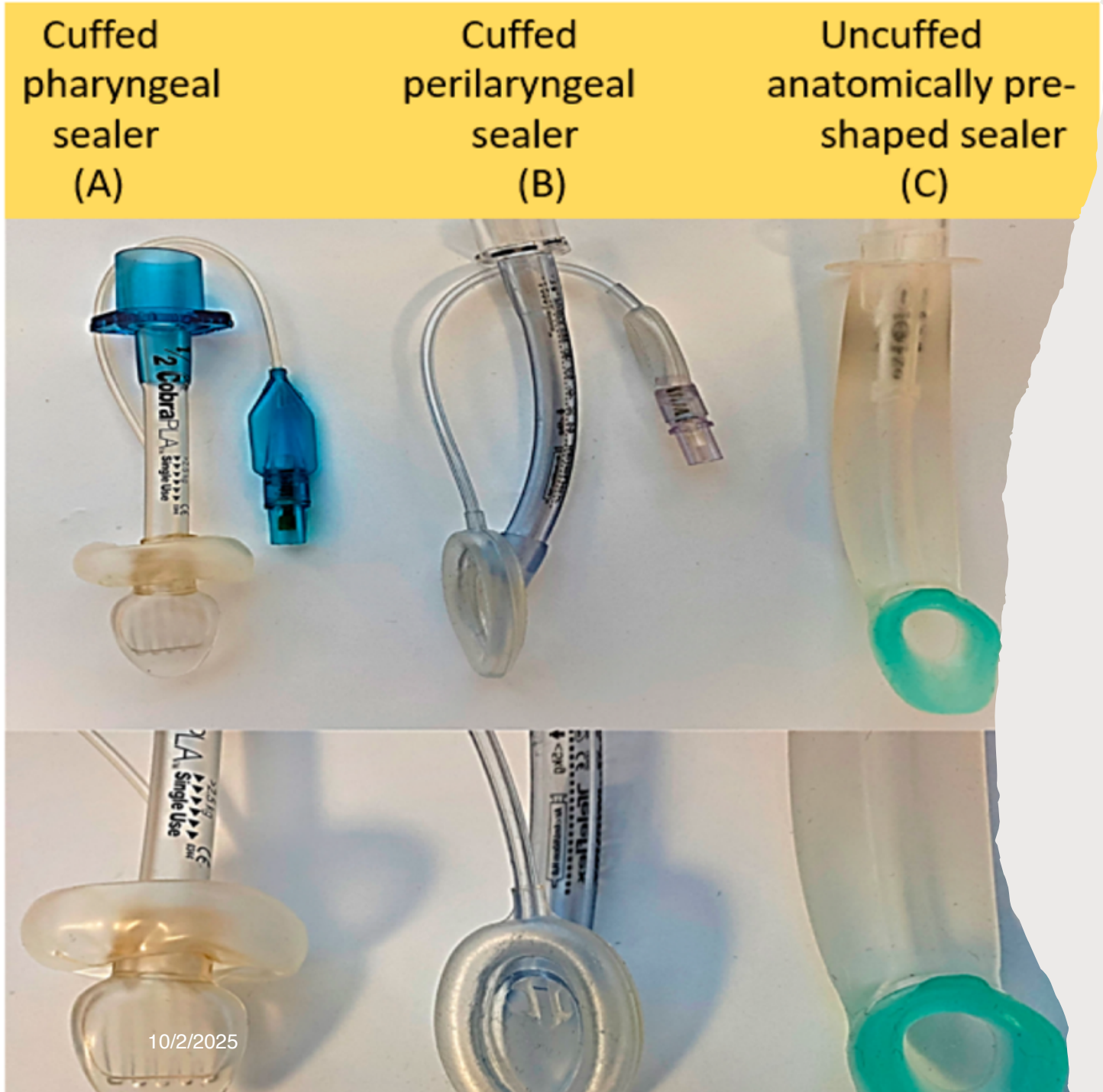
- LMA – 1983 Archie Brain
- Replaced “mask cases”
- Surgery less than 2 hours
- Spontaneous breathing
- No muscle relaxant
- Autoclaved, reusable (30 uses)
- Many contraindications

LMA CLASSIC



FDA approval 1991

Name	Type	Image	Material	Advantages	Disadvantages
LMA Classic	First generation		Silicone	Original design, less pharyngolaryngeal trauma, respiratory problems vs. ETT, rescue device	Low OSP,† increased cost with processing
LMA Unique	First generation		Polyvinyl chloride	Disposable form of classical LMA	Low OSP
LMA FasTrach™			Polyvinyl chloride and silicone	Intubating LMA to guide blind, difficult intubations	Bulky, no pediatric sizes, increased cost of processing
LMA Flexible			Polyvinyl chloride and silicone	Wire-reinforced tubing, head and neck procedures	Low OSP, increased cost with processing
LMA ProSeal™	Second generation		Silicone	Gastric suction port, built in bite block, high OSP	Bulky, folding of mask can obstruct the gastric port, increased cost of processing
LMA Supreme	Second generation.		Polyvinyl chloride	Disposable version of ProSeal LMA	Bulky, folding of mask can obstruct the gastric port



3 Classifications by sealing mechanisms

- Cuffed perilaryngeal sealers
- Cuffed pharyngeal sealers
- Cuffless anatomically pre-shaped sealers

Table 1. Extraglottic Airway Device Classifications

EGA with an inflatable periglottic cuff
- Ultra CPV family (AES)
- Ambu Aura family (Ambu)
- ILA/airQ (Cookgas)
- Vital Seal (GE Healthcare)
- King LAD family (King Systems)
- LMA device family (LMA Company)
- Soft Seal Laryngeal Mask (Portex)
- Sheridan Laryngeal Mask (Teleflex)

EGAs with no inflatable cuff
- i-gel (Intersurgical)
- SLIPA (Slipa Medical)

EGAs with 2 inflatable cuffs
- Laryngeal Tube family (King Systems)
- Esophageal Tracheal Combitube (Nellcor)
- Rusch EasyTube (Teleflex)

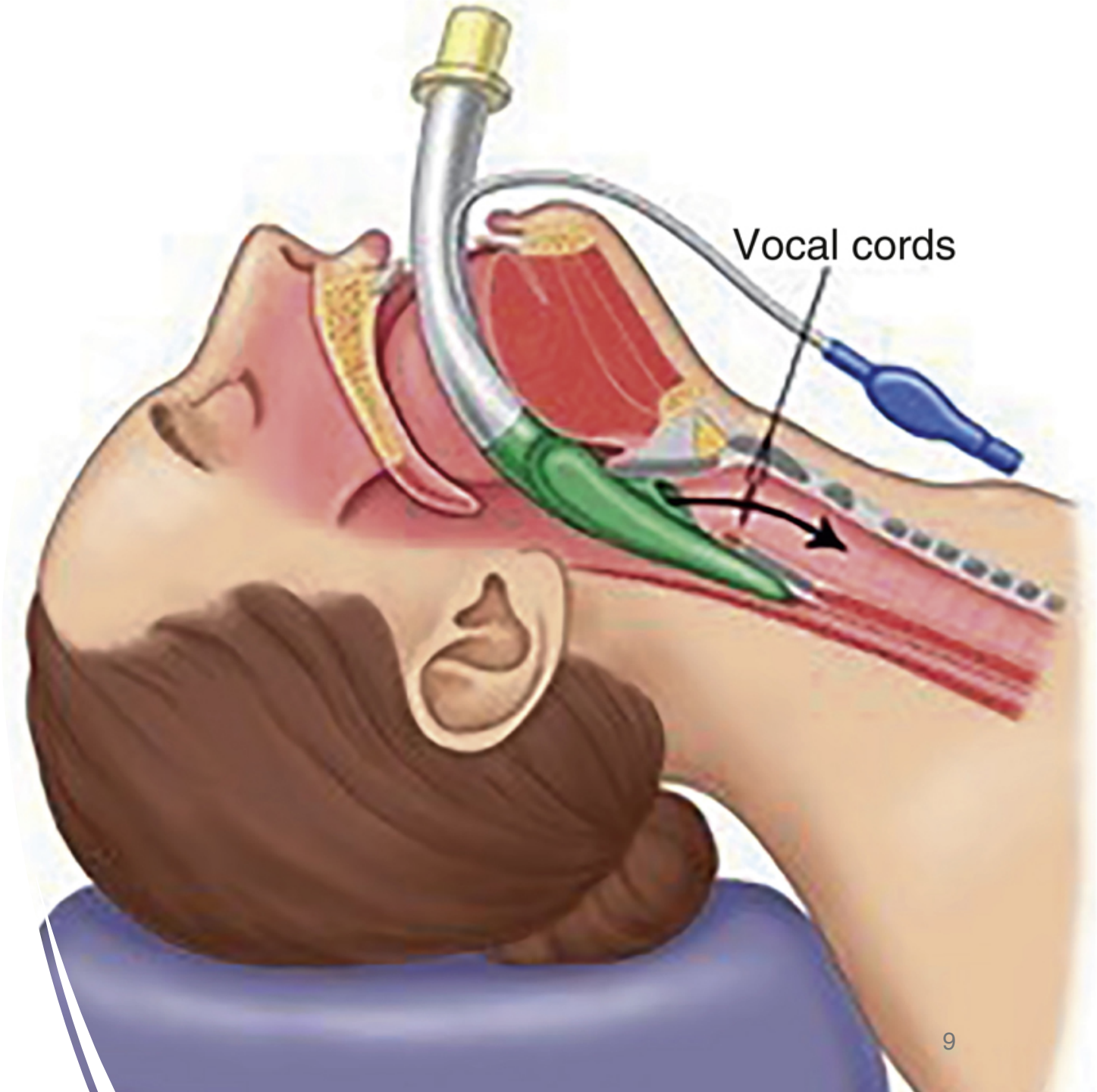
EGAs with single pharyngeal inflatable cuff
- Cobra PLA family (Pulmodyne)

SGAs

- airtight seal enclosing the hypopharyngeal space
- proper size selection to ensure safe, effective ventilation.
- weight based sizing recommendations through testing on cadavers

Advantages

- Better hemodynamic stability
- Less injury to airway
- Rescue device for difficult airway



Non-standard use	Concerns	Conclusions
Mechanical ventilation compared to spontaneous ventilation	Gastric insufflation, aspiration with high inspiratory pressures Inability to self-regulate anesthesia depth	Adequate ventilation can be achieved with various ventilatory modes Minimize inspiratory pressures to decrease risk of gastric aspiration
Use of muscle relaxant	Facilitate mechanical ventilation	May benefit LMA insertion and surgeries
Laparoscopic surgery	Aspiration risk with insufflated abdomen	Likely acceptable in properly fasted patients with second-generation devices
Obese patients	Poor pulmonary compliance Ventilation difficulty	Acceptable for some obese patients, further study warranted prior to recommendation for routine use in morbid obesity Successful as a temporary rescue device

Muscle relaxant

- success rate of first attempt insertion was 92% with the use of muscle relaxant versus 89% without muscle relaxant.

Muscle Relaxant

- 60 patients – compared insertion with and without 0.15 mg/kg rocuronium
- Using low-dose rocuronium increases jaw relaxation, reduces propofol requirements in induction for LMA insertion, decreases the time needed for its insertion, and relatively decreases postoperative complications related to LMA insertion.

Sizing

- Too large – cuff can impede oral cavity
- Too small – leak, glottic impaction
- Overinflation – rarely helpful

Sizing

- Most common deciding factors:
  - Gender
    - Women (4) vs Men (5)
  - Mouth opening
  - Weight

i-gel size	Patient size	Patient weight guidance (kg)
1	Neonate	2-5
1.5	Infant	5-12
2	Small paediatric	10-25
2.5	Large paediatric	25-35
3	Small adult	30-60
4	Medium adult	50-90
5	Large adult+	90+

Sizing studies

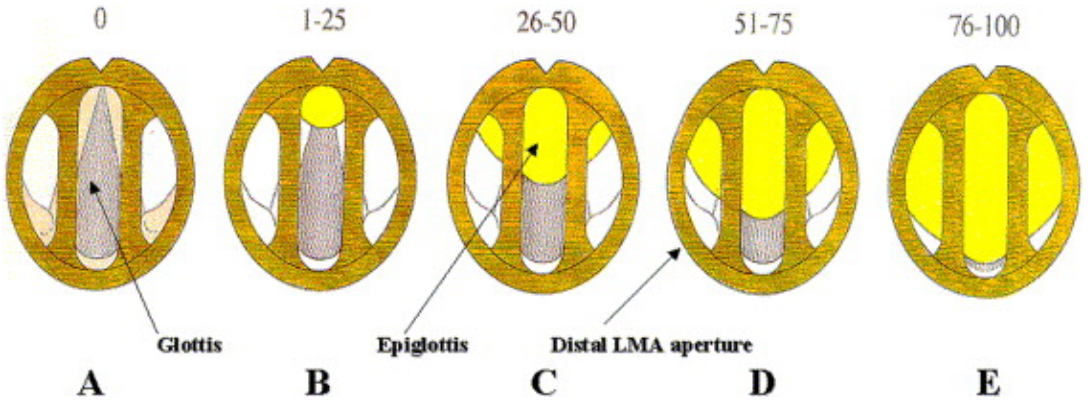
- 300 ASA I-II females
- Height vs weight
- Size 4 - >170 cm, Size 3 <170 cm
- Weight recommendation from manufacturer

Results

- First attempt success rates
  - Weight group – 69.4% ,
  - higher leak volume, higher rate of sore throat
  - Height group – 94.3%

Recommendations

- Ideal body weight
  - Easier placement
  - Lower peak pressures
  - Higher fiberoptic scores (viewed placement)
  - Less sore throat
  - Less bloody secretions on SGA

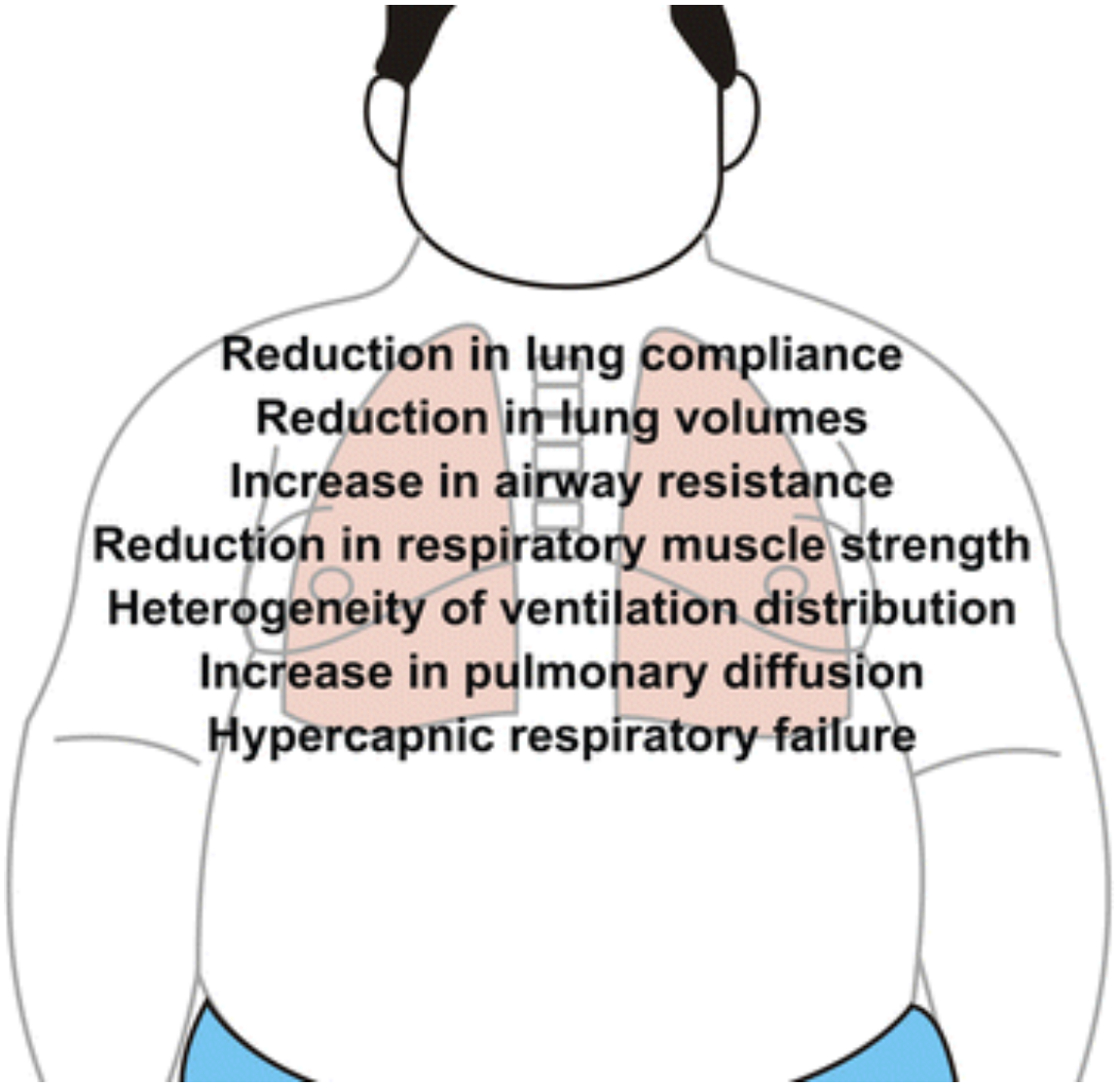


Recommendations

- 36 yr old female
- Actual weight = 100 kg, height 170 cm
- Manufacturer – size 5 LMA
- Ideal body weight = 60 kg
- Manufacturer – size 3 or 4

Obesity

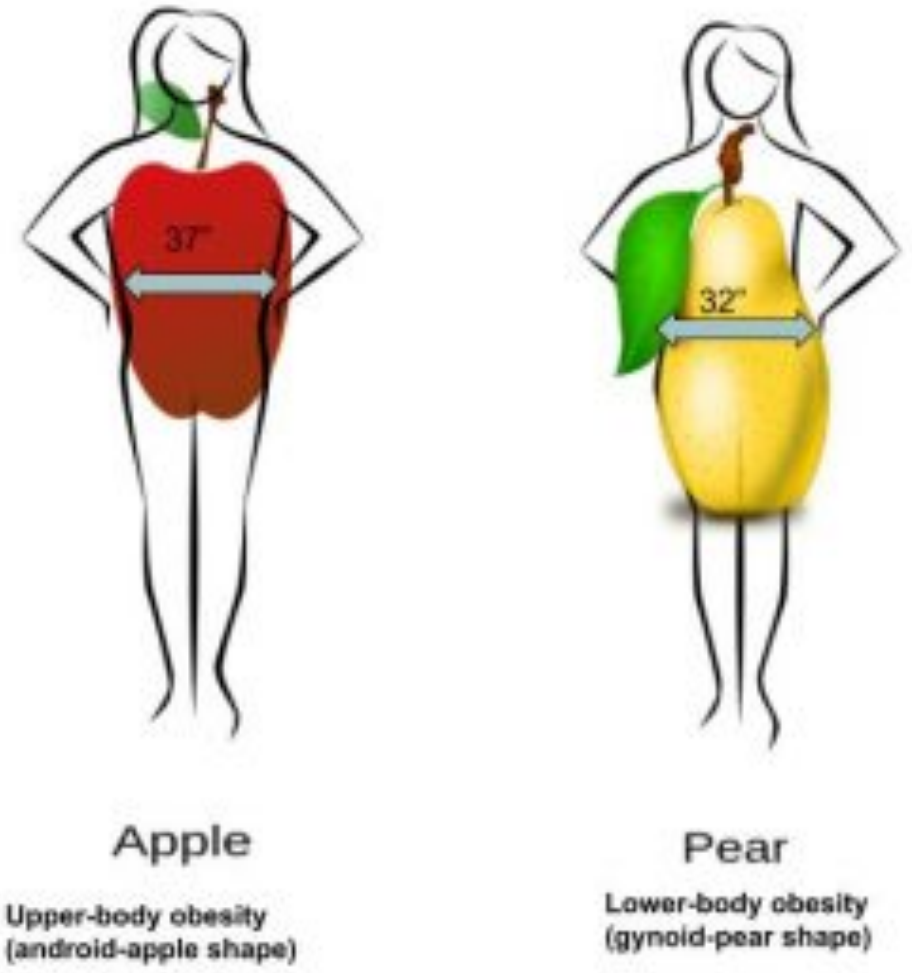
- Restrictive lung pattern due to abdominal contents limiting diaphragm motion and yielding less respiratory compliance.



Obesity

- Studies have proved successful ventilation of obese patients with a BMI below 30
- Cheong et al.
- Body mass index (BMI) over 30, there was a 2.5 times increased risk of having ventilatory problems with general anesthesia
- Zoremba et al.
- Postoperative lung function and saturations in obese patients (BMI 30 to 35) undergoing minor peripheral surgery with a ProSeal LMA™ vs. ETT
- Ventilation was adequate in both groups while postoperative pulmonary complications were decreased in the LMA group.

Weight distribution



Sizing

- Asai et al.
- leaks were reduced with placement of the larger size LMAs in both males and females.
- Minimal inflation volumes were used to create an adequate seal, resulting in less pressure measured on the pharynx.

Sizing

- Brimacombe et al.
- pharyngolaryngeal complaints in 300 patients
- comparing LMA use with low cuff volumes and LMA with high cuff volumes
- higher incidence of sore throat and dysphagia in the latter group.

Elderly

- glottic opening tends to become larger and less efficient due to age-related changes
- presbylarynx or vocal fold atrophy
- vocal folds losing muscle tone, bulk, and elasticity, which prevents them from closing completely

Induction and Maintainence

- Procedure ?
- Propofol = 2-3 mg/kg
- Narcotic? fentanyl, remi
- Controlled breathing (SIMV, PCV)
- Spontaneous breathing
- PSV PRO

SGA and PPV

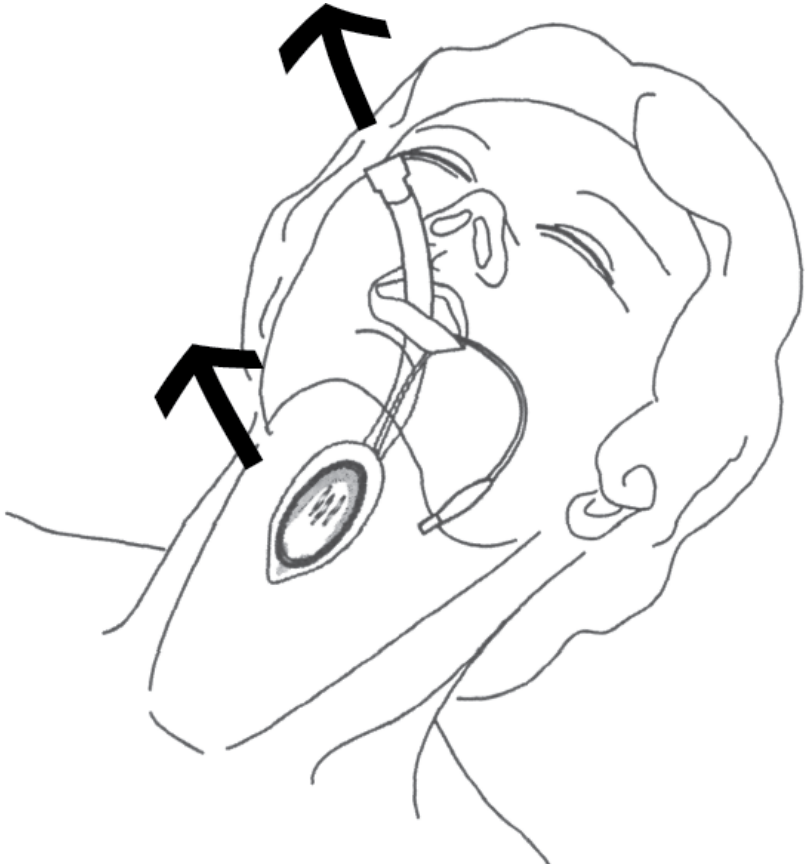
- Retrospective analysis
- 65 000 procedures
- Normal airway pressure (<20 cm) and compliance
- Aspiration risk was no higher than ETT
- LMA – PSV with PEEP better gas exchange than spontaneous breathing

PPV

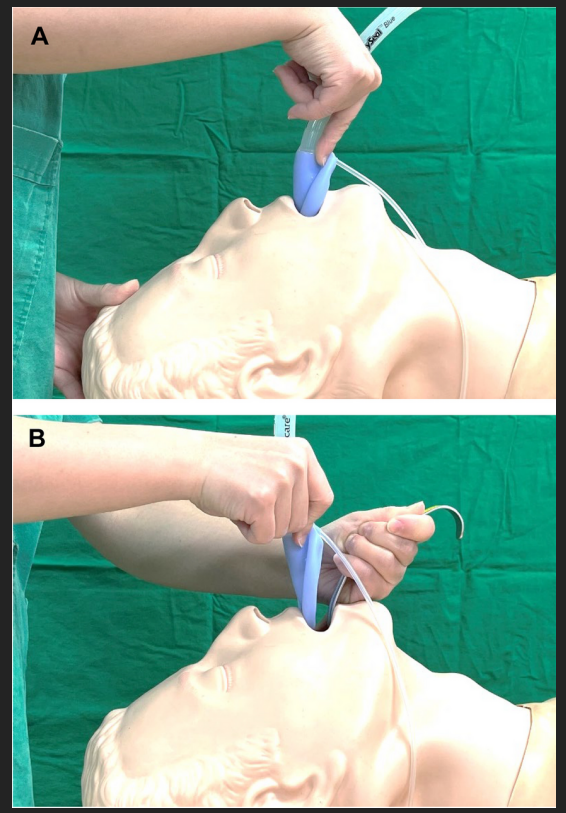
- Positive inspiratory pressure greater than 15 cm H_2O has been suggested to lead to incompetence of the lower esophageal sphincter and result in insufflation of air into the stomach with the potential for aspiration.
- End-tidal carbon dioxide was higher, tidal volumes were smaller, and oxygen saturation was lower in patients undergoing spontaneous breathing compared to PCV, VCV, and PSV modes.

Insertion

- Cuff deflated – manufacturer
  - Cuff inflation often causes the larynx to rise in the neck, as well as to cause the tube to rise slightly out of the mouth.
- Cuff partially inflated
  - Harder to insert in small mouth
  - Catch on jagged teeth
  - Can’t insert as deeply



Tongue blade



Bailey maneuver

- Exchange of an ETT for a laryngeal mask airway (any version) at the end of a long surgical procedure
- “deep” anesthesia
- inserted behind the ETT and its cuff inflated.
- ETT cuff is deflated and the tube removed.

Removing LMA

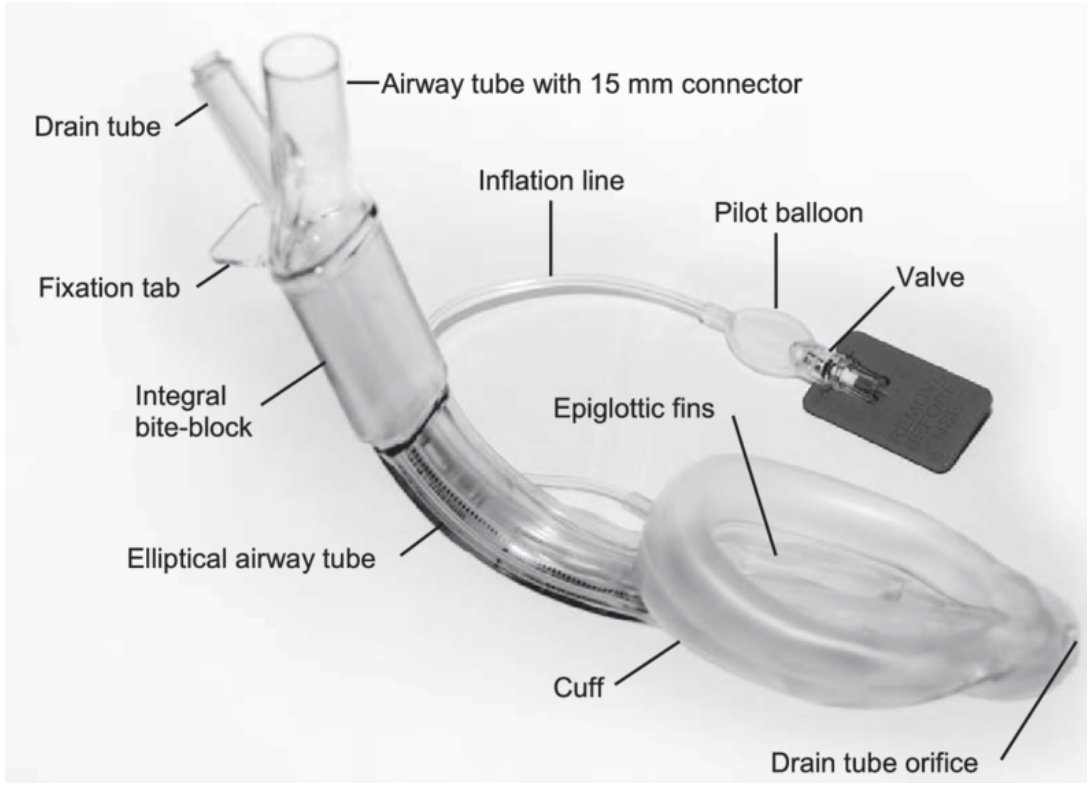
2,242 patients to assess whether it was better to remove the LMA deep or awake

review concluded that there was not sufficient high-quality evidence to determine if one method was superior to the other

Absolute Contraindications	Relative Contraindications
Trauma	Major abdominal surgery
Nonfasted patients	Pregnancy >14 weeks
Bowel obstruction	Prone position
Emergency surgery	Airway surgery
Delayed gastric emptying	Laparoscopic surgery
	Obesity, BMI >30
	Decreased lung compliance with PIP >20 cm H_2O
	Altered mental status

C-section

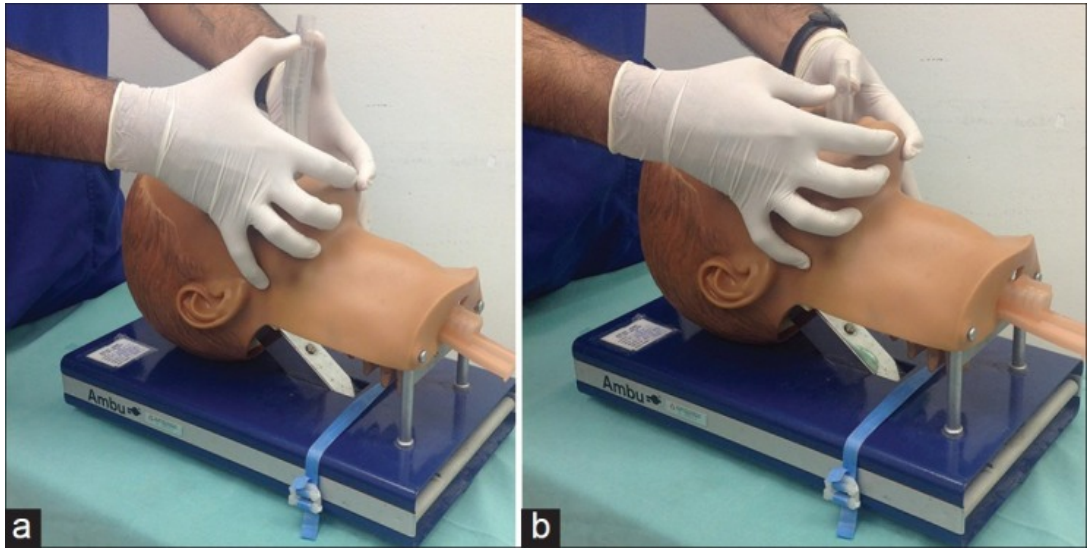
- 700 appropriately fasted patients underwent general anesthesia C-section
- LMA Supreme
- No reported cases of aspiration with placement of an orogastric tube through the gastric port




EASE OF INSERTION

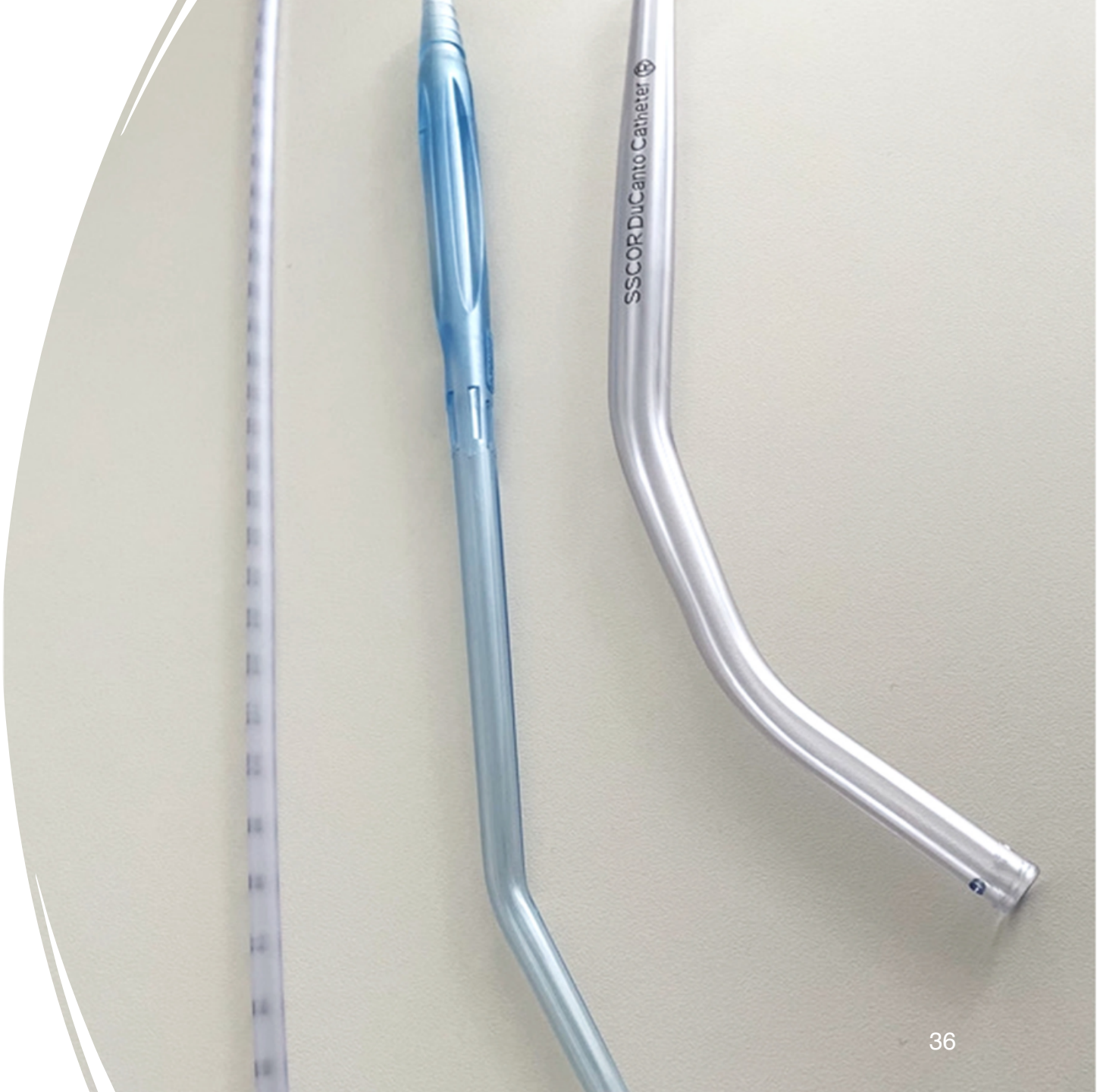
I - Gel

- First attempt success rate is 86% with primary (manufacturer's recommended) insertion technique
- Reverse I-Gel insertion technique with jaw thrust (manufacturer) requires 2 people
- Modified jaw thrust insertion technique



SALAD

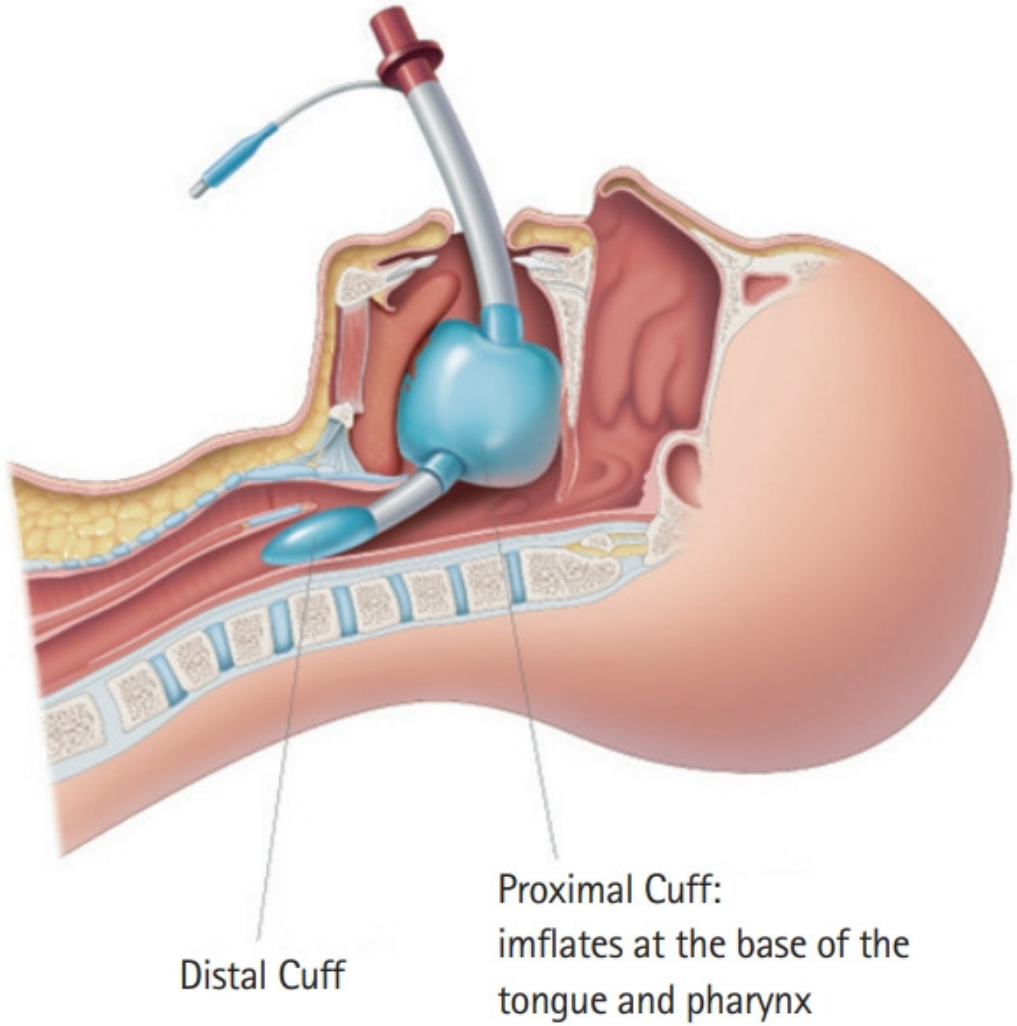
- SALAD (Suction-Assisted Laryngoscopy Airway Decontamination) technique
- DuCanto catheter

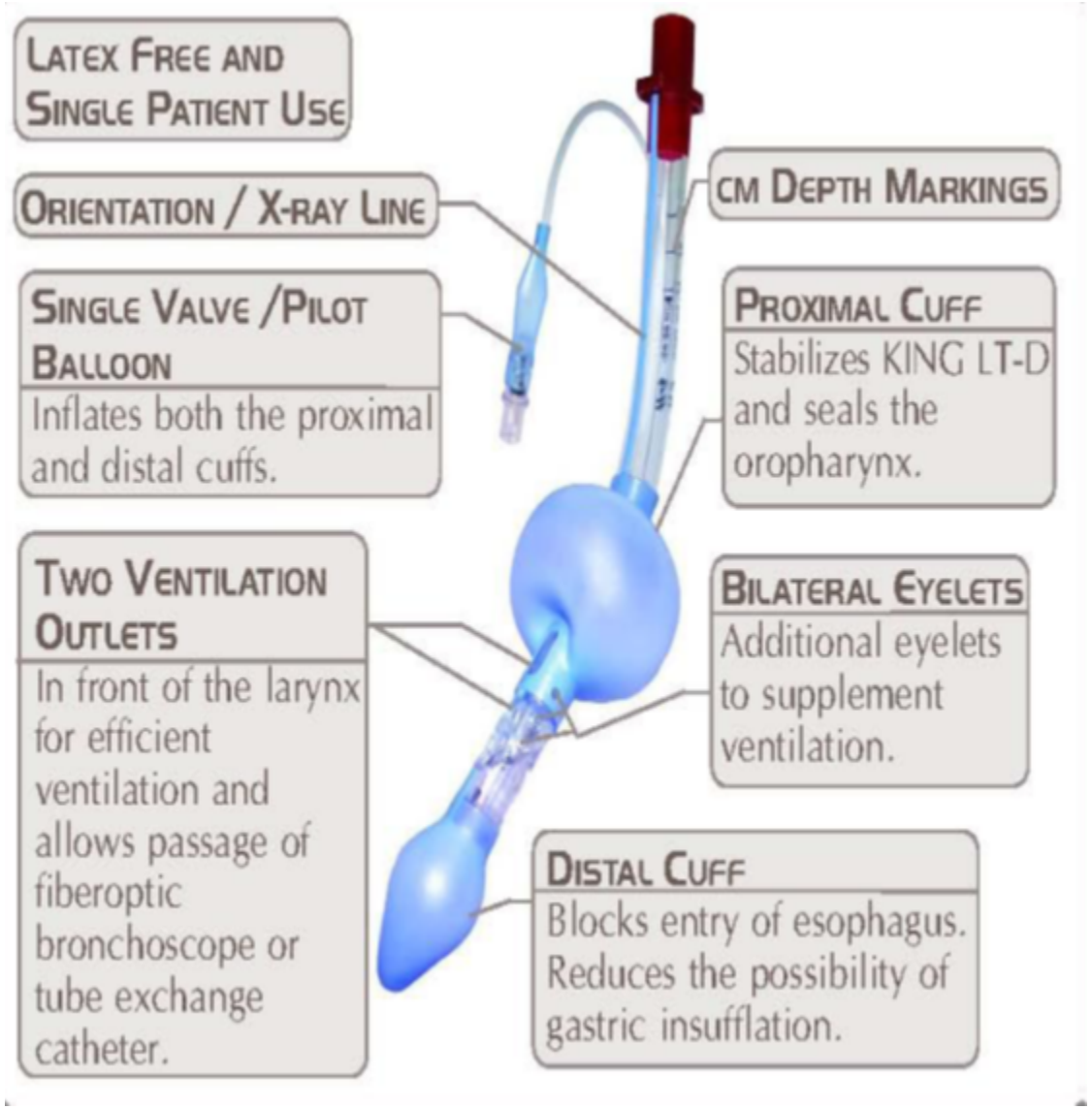


SALAD technique

Primarily used by EMS

King airway




LATEX FREE AND SINGLE PATIENT USE
ORIENTATION / X-RAY LINE
SINGLE VALVE /PILOT BALLOON
Inflates both the proximal and distal cuffs.
TWO VENTILATION OUTLETS
In front of the larynx for efficient ventilation and allows passage of fiberoptic bronchoscope or tube exchange catheter.
CM DEPTH MARKINGS
PROXIMAL CUFF
Stabilizes KING LT-D and seals the oropharynx.
BILATERAL EYELETS
Additional eyelets to supplement ventilation.
DISTAL CUFF
Blocks entry of esophagus. Reduces the possibility of gastric insufflation.

Complications

Complications

- Postoperative sore throat (POST), with endotracheal tube affects up to 62% of patients
- Eighth most common complication
- 5264 patients subjected to non-thyroid surgery under general anesthesia revealed an incidence of POST up to 45.4% in those receiving ETT compared to 17.7% in those using LMA

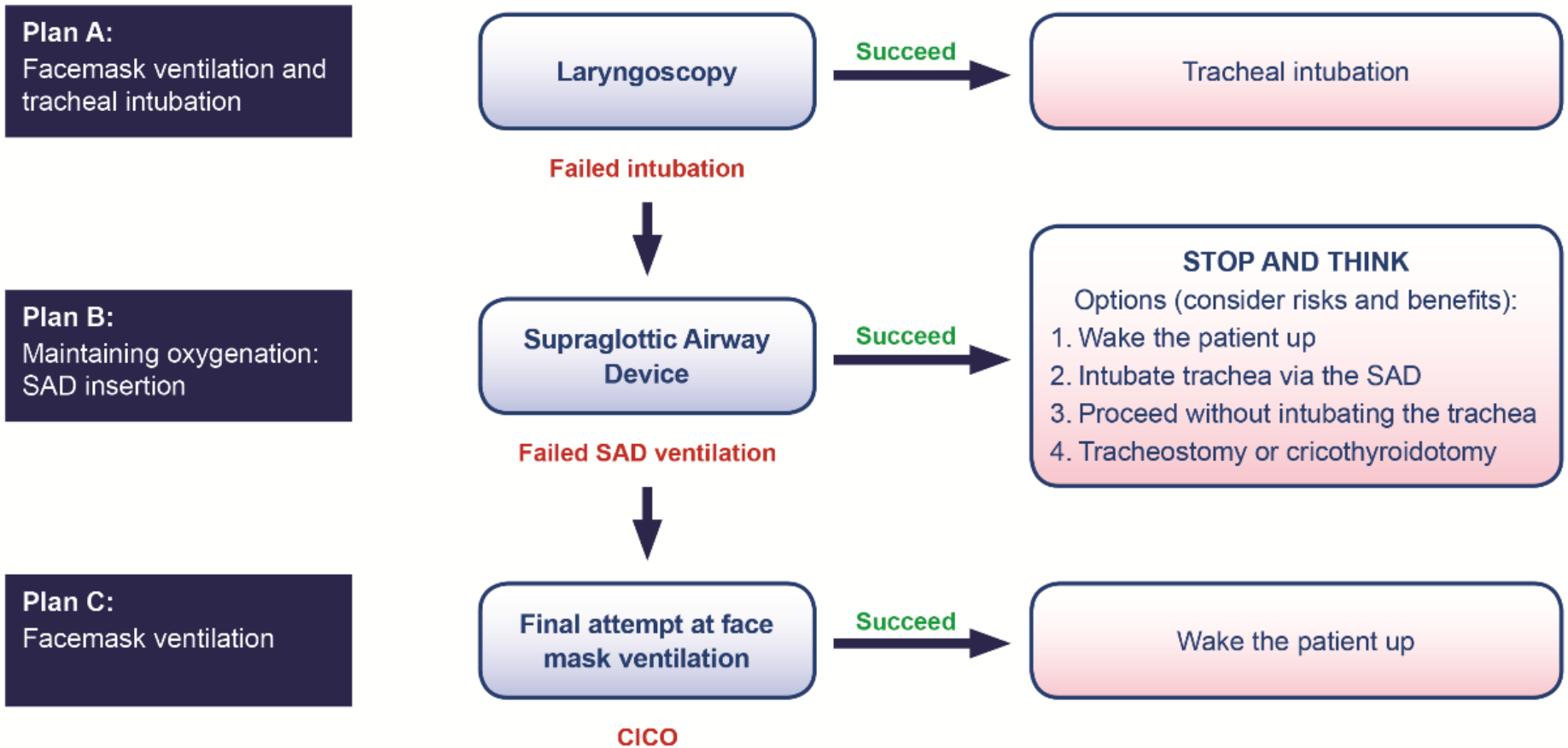
Complications

- tongue compression
- hoarseness
- coughing
- laryngospasm
- aspiration
- vocal cord paralysis
- arytenoid dislocation
- tissue trauma
- uvular necrosis or lip lacerations.

Site of injury	Type(s) of injury	Mechanism(s) of injury
Pharyngeal mucosa	Laceration Bruising	Forceful insertion, inadequate lubrication Prolonged insertion, too high cuff pressures
Laryngeal apparatus	Arytenoid dislocation Recurrent laryngeal nerve injury	Direct trauma Compression of the nerve in piriform fossa
Uvula	Trauma leading to ischemia and necrosis	Direct trauma Prolonged compression
Epiglottis	Bruising Laceration	Incorrect or forceful insertion, anatomical abnormalities
Tongue	Frenular injury Lingual nerve injury	Incorrect or forceful insertion Compression of inferior or lateral surface of the tongue by cuff or tube of SGA
Teeth	Displacement Fracture of roots	Direct trauma Biting on SGA/bite block
Lips	Laceration Nerve injury	Direct trauma Compression by device, taping to device

DAS Difficult intubation guidelines – overview

2015




Questions
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Answers
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