TEŠKA INTUBACIJA
Priručnik za preživljavanje pacijenta (i anesteziologa)

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Težak airway

ASA – definicija teškog airway-a

“Klinička situacija u kojoj konvencionalno trenirani anesteziolog ima teškoće sa ventilacijom na masku, sa trahealnom intubacijom ili sa obe zajedno."

Teška ventilacija

Nemogućnost treniranog anesteziologa da održi saturaciju kiseonika >90% koristeći masku za lice I 100% inspiratorni kiseonik, pod uslovom da je nivo saturacije kiseonika pre početka ventilacije bio u granicama normale

Teška intubacija

- Više od 3 pokušaja
- Duže od 10 minuta
- Neuspeh optimalnog najboljeg pokušaja

Predictors of difficulty to face mask ventilate (OBESE)

1. The **O**bese (body mass index >30kg/m2)
2. The **B**earded
3. The **E**lderly (older than 55 y)
4. The **S**norers
5. The **E**dentulous

Učestalost

- Teška ventilacija na masku
  - 0.1% - 5%
- Teška LMA ventilacija
  - 0.2% - 1%
- Teška intubacija
  - 1-2% normalne hirurške populacije
  - 50% pacijenata sa artritičnom vratnom kičmom

Causes of difficult airway

- Stiffness
  - Arthritis of neck/jaw/larynx.
  - Fixation devices
  - Scleroderma
  - Diabetes
- Deformity
  - Cervical and craniofacial
  - Burns/trauma/infection
- Swelling
  - Infection/tumour/trauma/burns
  - Anaphylaxis/haematoma/acromegaly
- Reflexes
  - Cough/breathholding
  - Laryngospasm/salivation/regurgitation
- Foreign body
- Other – Pregnant/full stomach

Table - 1 : Airway-compromising conditions

Congenital :	
Pierre-Robin syndrome	Micrognathia, macroglossia, cleft soft palate
Treacher-Collins syndrome	Auricular and ocular defects, malar and mandibular hypoplasia
Goldenhar's syndrome	Auricular and ocular defects, malar and mandibular hypolasia
Down's syndrome	Poorly developed or absent bridge of the nose, macroglossia
Kippel-Feil syndrome	Congenital fusion of a variable number of cervical vertebrae, restriction of neck movement
Goiter	Compression of trachea, deviation of larynx/trachea
Acquired :	
Infections:	
Supraglottis	Laryngeal oedema
Croup	Laryngeal oedema
Abscess (intraoral, retropharygeal)	Distortion of the airway and trismus
Ludwig's angina	Distortion of the airway and trismus
Arthritis:	
Rheumatoid arthritis	Temporomandibular joint ankylosis, cricoarytenoid arthritis, deviation of laynrx, restricted mobility of cervical spine
Ankylosing spondylitis	Ankylosis of cervical spine, less commonly ankylosis of temporomandibular joints, lack of mobility of cervical spine
Benign tumors: Cystic hygroma, lipoma, adenoma, goiter	Stenosis or distortion of the airway, fixation of larynx or adjacent tissues secondary to infiltration or fibrosis from irradiation
Malignant tumor, Facial injury, cervical spine injury, laryngeal/tracheal trauma	Edema of the airway, hematoma, unstable fraction(s) of the maxillae, mandible and cervical vertebrae.
Obesity	Short thick neck, redundant tissue in the oropharynx, sleep apnea
Acromegaly	Macroglossia, prognathism
Acute burns	Oedema of airway

Mallampati Score

Sensitivity: 44% - 81%
Specificity: 60% - 80%

- Roughly corresponds to Cormack and Lehane's laryngoscopy views
- *Class I (easy)—visualization of the soft palate, fauces, uvula, and both anterior and posterior pillars*
- *Class II—visualization of the soft palate, fauces, and uvula*
- *Class III—visualization of the soft palate and the base of the uvula*
- *Class IV (difficult)—the soft palate is not visible at all*

Airway assessment

- Thyromental Distance
  - 6.5cm normal
- Sternomental Distance
  - >12.5cm normal
- Protrusion of Mandible

LEMON Law

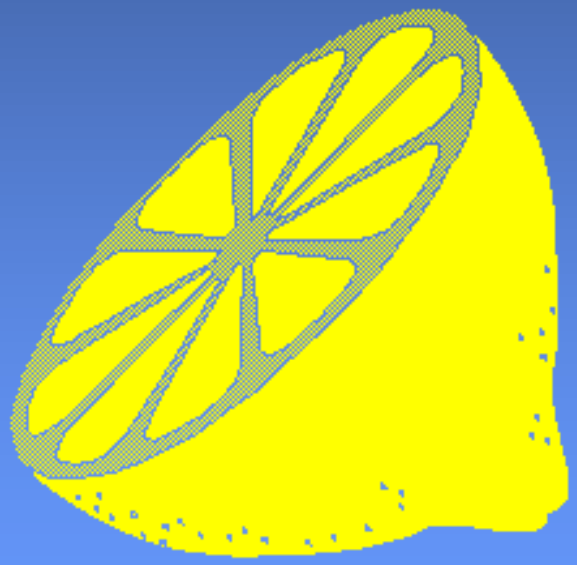
Look at anatomy

Examine the airway

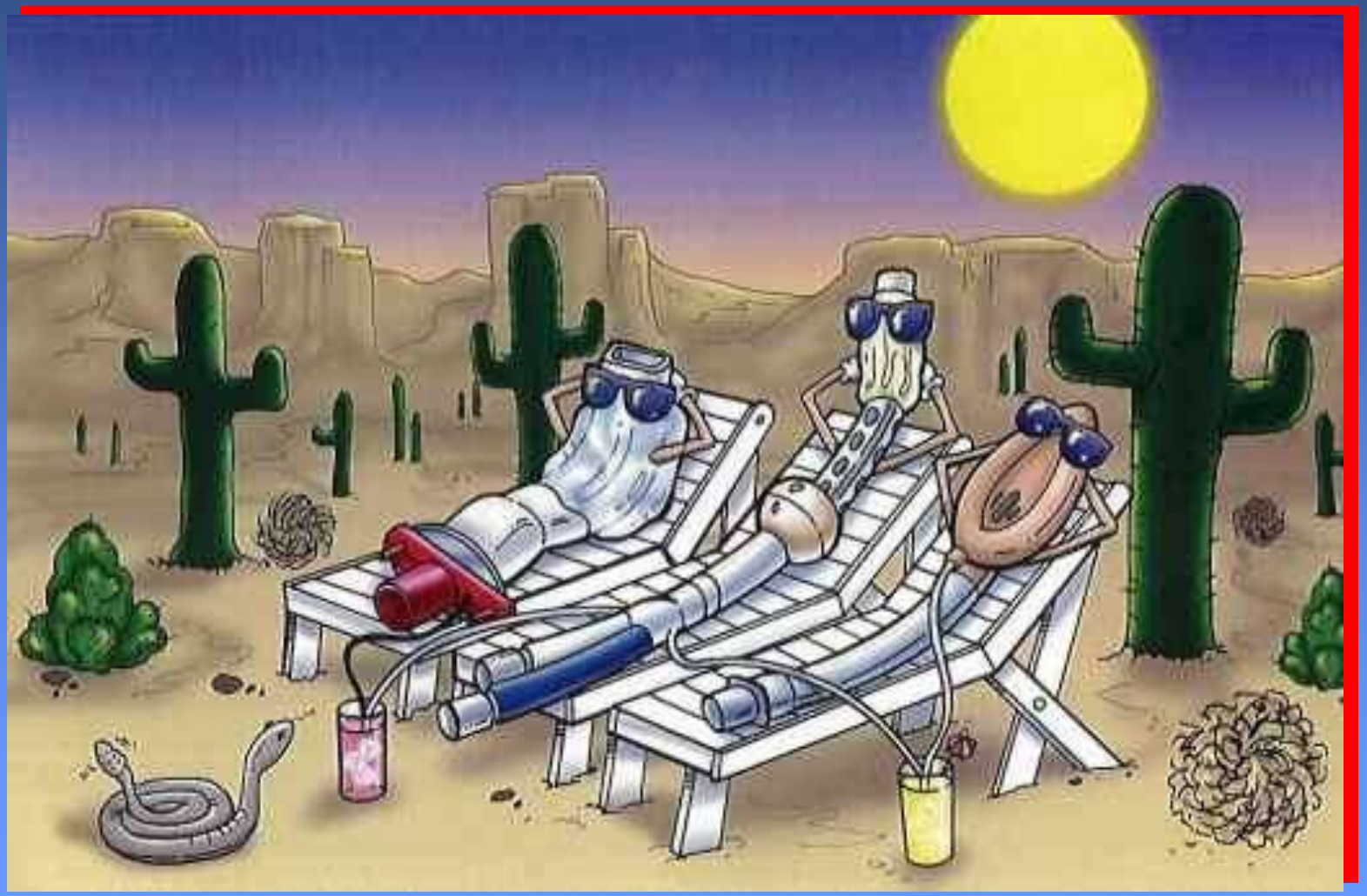
Mallampati

Obstructions

Neck mobility



Airway pomagala- stara I nova



Emergency Airway Trolley

- Rigid laryngoscope blades
- Tracheal tubes
- Tracheal tube guides
- Laryngeal Mask Airways
- Fibreoptic intubation equipment
- Non-invasive/minimally invasive airways
- Surgical Airway
- CO2 detectors

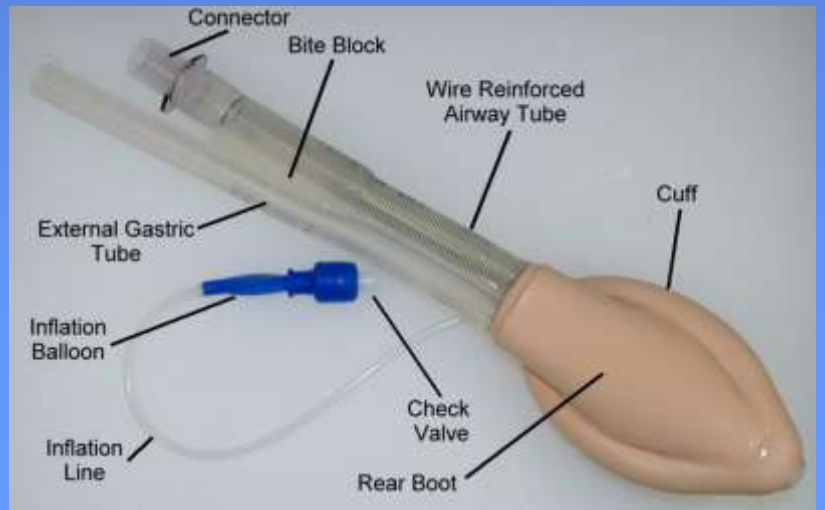
Alternative Airway Techniques

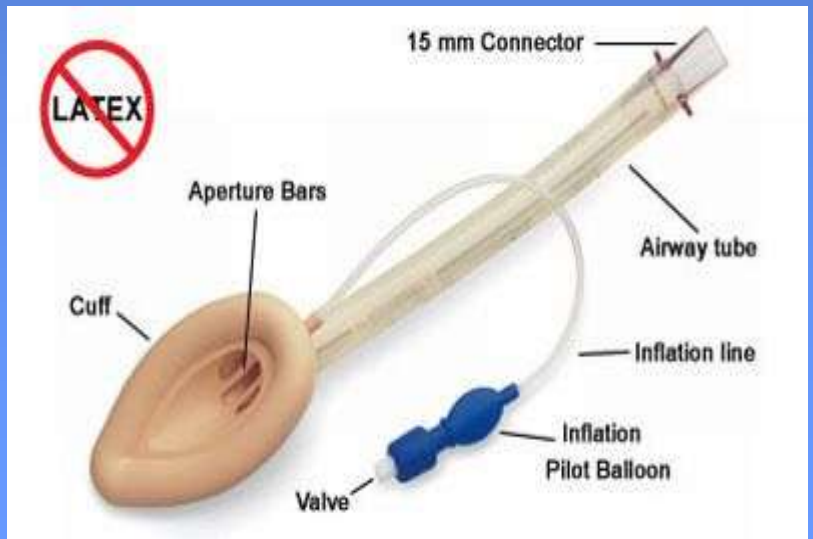
- LMA/Laryngeal Tube
- Transtracheal Jet Ventilation
- Retrograde Intubation
- Lightwand
- Combitube

Elastična bužija

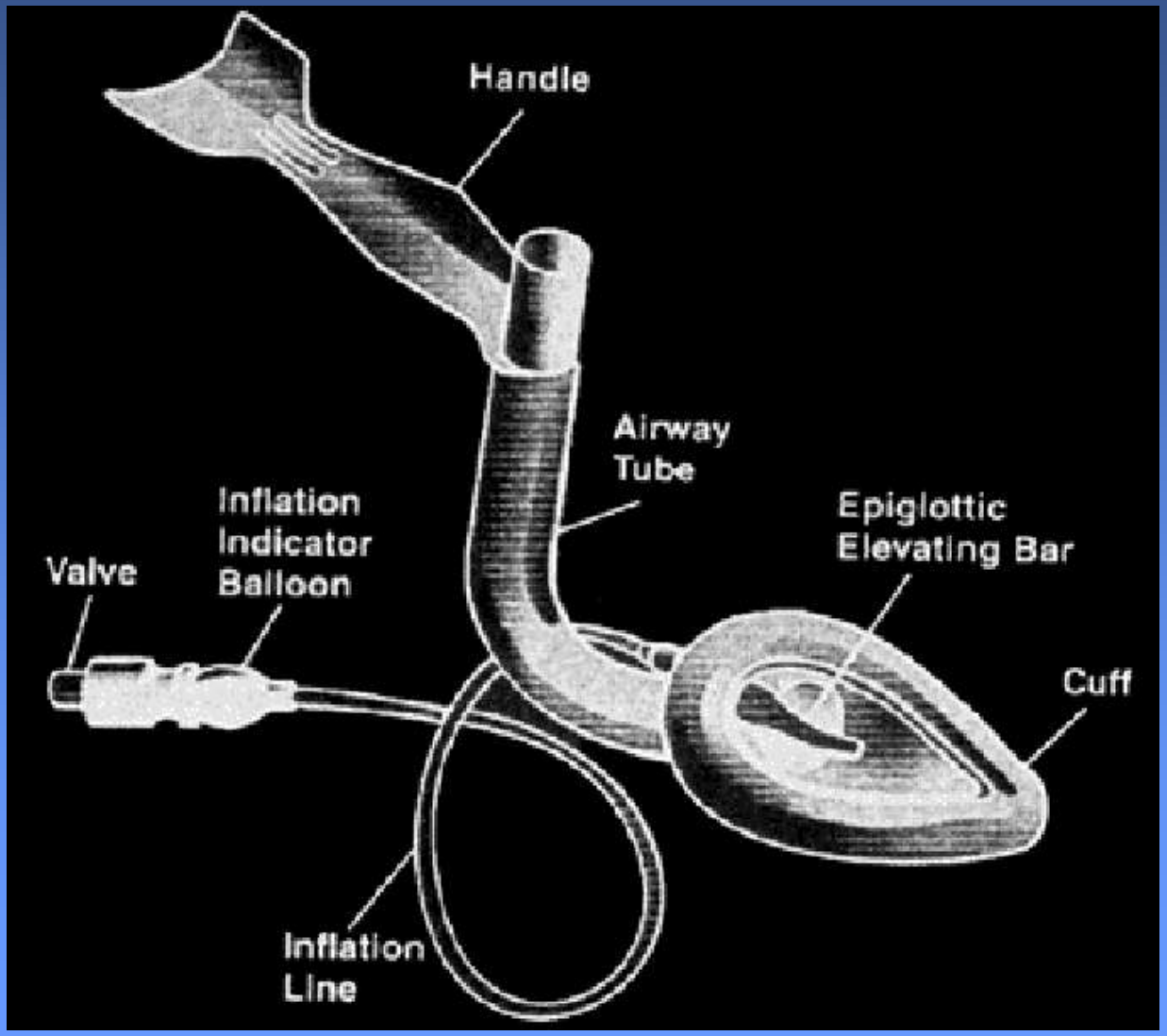
Laryngeal Mask

- Lubricated LMA inserted into hypopharynx
- Tip in upper oesophogeal sphincter
- Inflate Cuff
- Muscle relaxants not necessary
- C/I:
  - Need for high Peak Pressures
  - Risk of Aspiration
  - Pts with low lung compliance

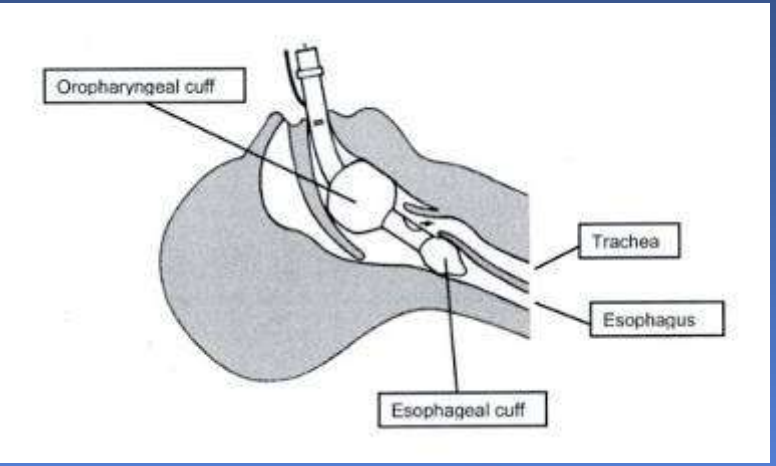




Intubating LMA

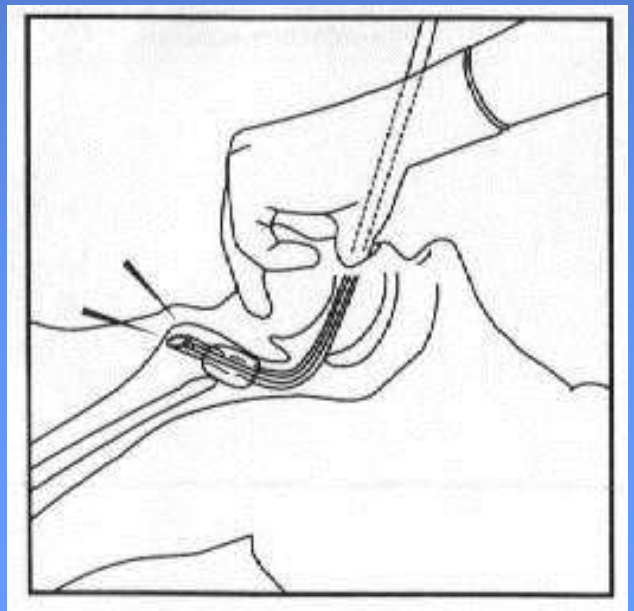


Laryngeal Tube



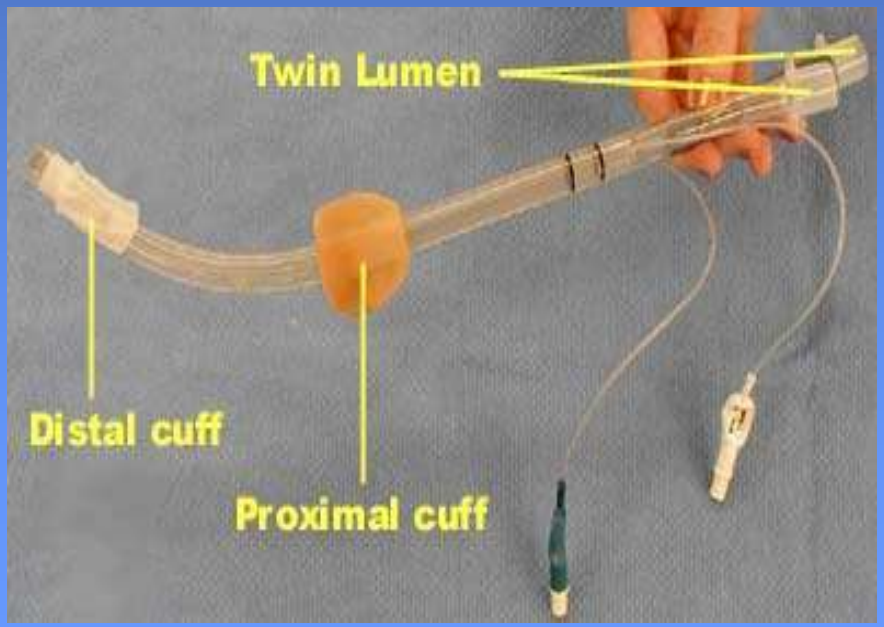
Lightwand

- Flexible
- Inserted through ET tube
- Insert into larynx
- Light dims if entering oesophagus
- Limitations: Dark room



Combitube

- Double lumen tube
- Placed into hypopharynx blindly
- C/I
  - Oesophageal pathology



Rigid Fiberoptic Scope

Bullard

Wu Scope

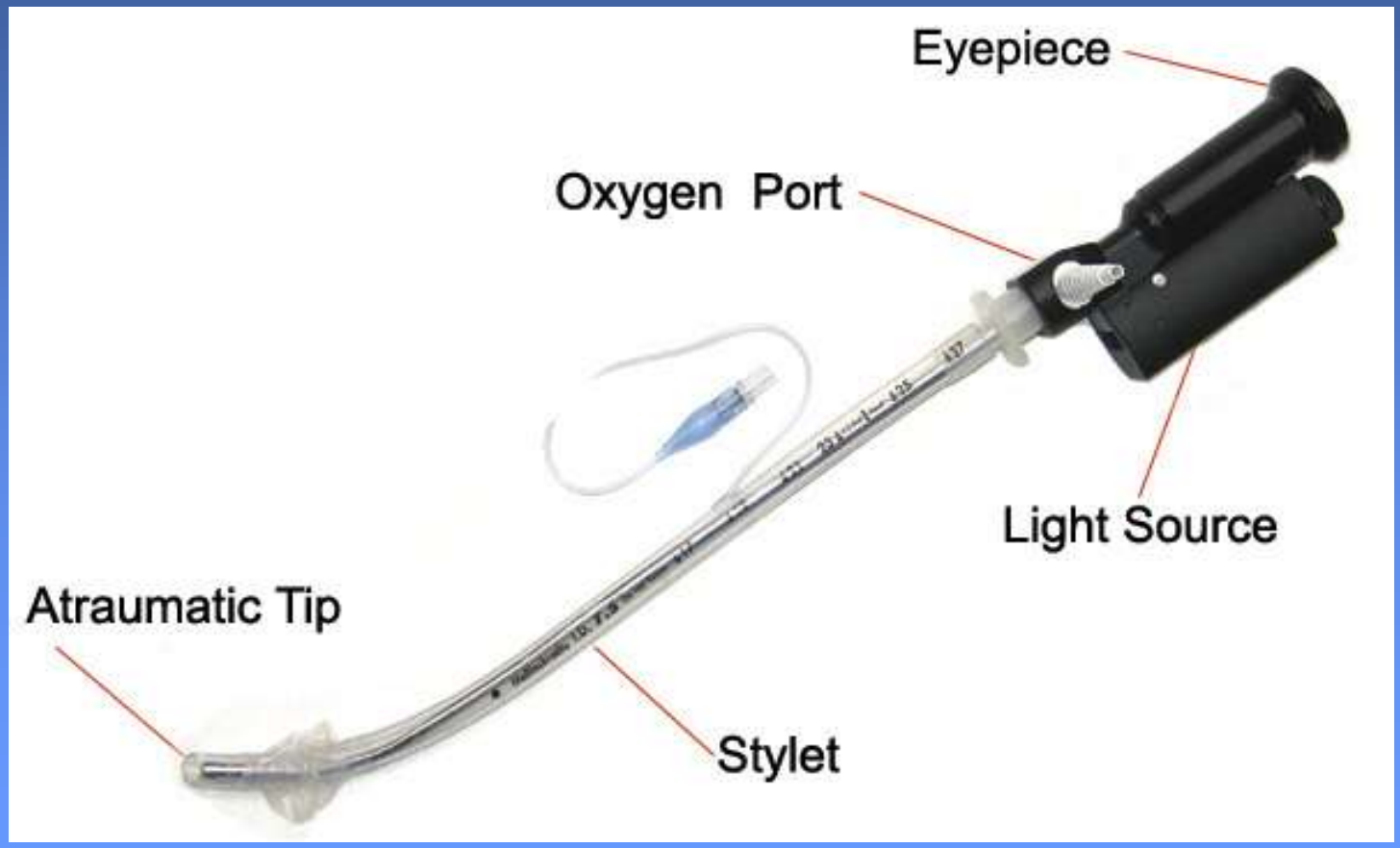
Rigid Fiberoptic Scope

Upsher

GlideScope

Rigid Fiberoptic Scope

Levitan Scope



Fiberoptic intubation

Surgical Airway

- Cricothyroidotomy
  - Complications:
    - Bleeding
    - Infection
    - Vocal cord damage
    - Tracheal stenosis
  - C/I
    - <12yrs
    - Laryngotracheal Disruption
    - Coagulopathy

Krikotiroidna punkcija



Bag Valve Mask

Figure 1 Supine patient without ramping

Figure 2 The thorax, shoulders, head and neck are supported to align the external ear with the sternal notch in the horizontal plane. Support may be provided with pillows a proprietary device.

The Royal College of Anaesthetists

The Difficult Airway Society

NAP4

4th National Audit Project of
The Royal College of Anaesthetists and The Difficult Airway Society

Major complications of airway management in the United Kingdom

Report and findings
March 2011

Editors
Dr Tim Cook, Dr Nick Woodall and Dr Chris Frerk

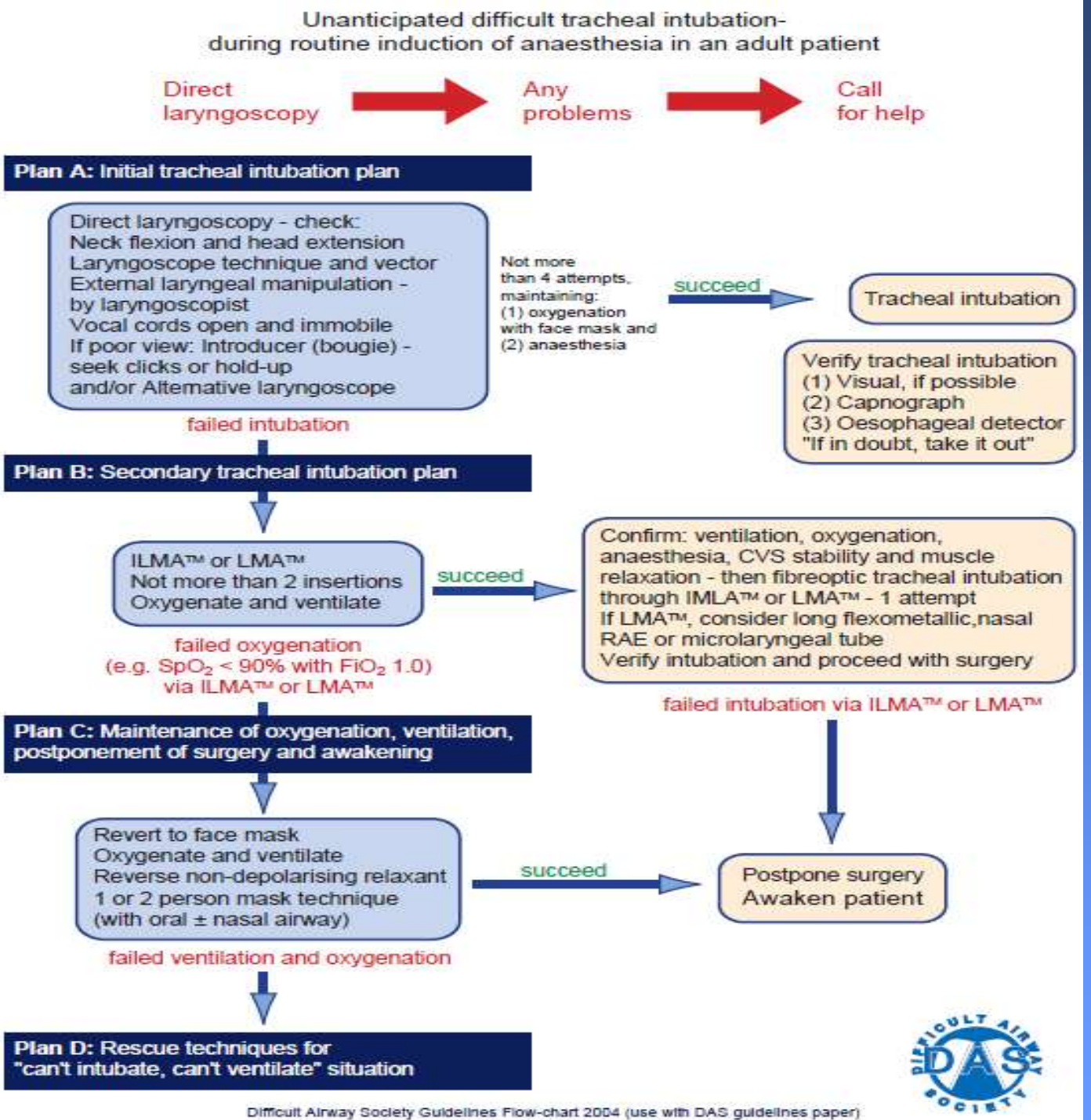
The National Patient Safety Agency
Patient Safety Division

The Intensive Care Society

The College of Emergency Medicine

Opšte preporuke

- Nemogućnost oksigenacije a ne intubacije usmrćuje pacijenta
- Nikad ne parališite pacijenta ako niste sigurni da mozete da intubirate
- Uvek razmotrite mogućnost awake fiberoptičke intubacije
- Ako intubacija nije neophodna razmotrite opciju regionalne anestezije ili neuraksijalnog bloka



Difficult Airway Society Guidelines Flow-chart 2004 (use with DAS guidelines paper)

Unanticipated difficult tracheal intubation - during rapid sequence induction of anaestheia in non-obstetric adult patient

Direct laryngoscopy → Any problems → Call for help

Plan A: Initial tracheal intubation plan

Pre-oxygenate
Cricoid force: 10N awake → 30N anaesthetised
Direct laryngoscopy - check:
- Neck flexion and head extension
- Laryngoscopy technique and vector
- External laryngeal manipulation - by laryngoscopist
- Vocal cords open and immobile

If poor view:
- Reduce cricoid force
- Introducer (bougie) - seek clicks or hold-up and/or Alternative laryngoscope

succeed → Tracheal intubation

Not more than 3 attempts, maintaining:
(1) oxygenation with face mask
(2) cricoid pressure and
(3) anaesthesia

Verify tracheal intubation
(1) Visual, if possible
(2) Capnograph
(3) Oesophageal detector
"If in doubt, take it out"

failed intubation

Plan C: Maintenance of oxygenation, ventilation, postponement of surgery and awakening

Maintain 30N cricoid force

Plan B not appropriate for this scenario

Use face mask, oxygenate and ventilate
1 or 2 person mask technique
(with oral ± nasal airway)
Consider reducing cricoid force if ventilation difficult

succeed → Postpone surgery and awaken patient if possible or continue anaesthesia with LMA™ or ProSeal LMA™ - if condition immediately life-threatening

failed oxygenation
(e.g. SpO_2 < 90% with FiO_2 1.0) via face mask

LMA™
Reduce cricoid force during insertion
Oxygenate and ventilate

succeed → Postpone surgery and awaken patient if possible or continue anaesthesia with LMA™ or ProSeal LMA™ - if condition immediately life-threatening

failed ventilation and oxygenation

Plan D: Rescue techniques for "can't intubate, can't ventilate" situation

Difficult Airway Society Guidelines Flow-chart 2004 (use with DAS guidelines paper)

Failed intubation, increasing hypoxaemia and difficult ventilation in the paralysed anaesthetised patient: Rescue techniques for the "can't intubate, can't ventilate" situation

failed intubation and difficult ventilation (other than laryngospasm)

Face mask
Oxygenate and Ventilate patient
Maximum head extension
Maximum jaw thrust
Assistance with mask seal
Oral ± 6mm nasal airway
Reduce cricoid force - if necessary

failed oxygenation with face mask (e.g. SpO_2 < 90% with FiO_2 1.0)

call for help

LMA™ Oxygenate and ventilate patient
Maximum 2 attempts at insertion
Reduce any cricoid force during insertion

succeed → Oxygenation satisfactory and stable: Maintain oxygenation and awaken patient

"can't intubate, can't ventilate" situation with increasing hypoxaemia

Plan D: Rescue techniques for "can't intubate, can't ventilate" situation

or

Cannula cricothyroidotomy

Equipment: Kink-resistant cannula, e.g.
Patil (Cook) or Ravussin (VBM)
High-pressure ventilation system, e.g. Manujet III (VBM)

Technique:
1. Insert cannula through cricothyroid membrane
2. Maintain position of cannula - assistant's hand
3. Confirm tracheal position by air aspiration - 20ml syringe
4. Attach ventilation system to cannula
5. Commence cautious ventilation
6. Confirm ventilation of lungs, and exhalation through upper airway
7. If ventilation fails, or surgical emphysema or any other complication develops - convert immediately to surgical cricothyroidotomy

fail →

Surgical cricothyroidotomy

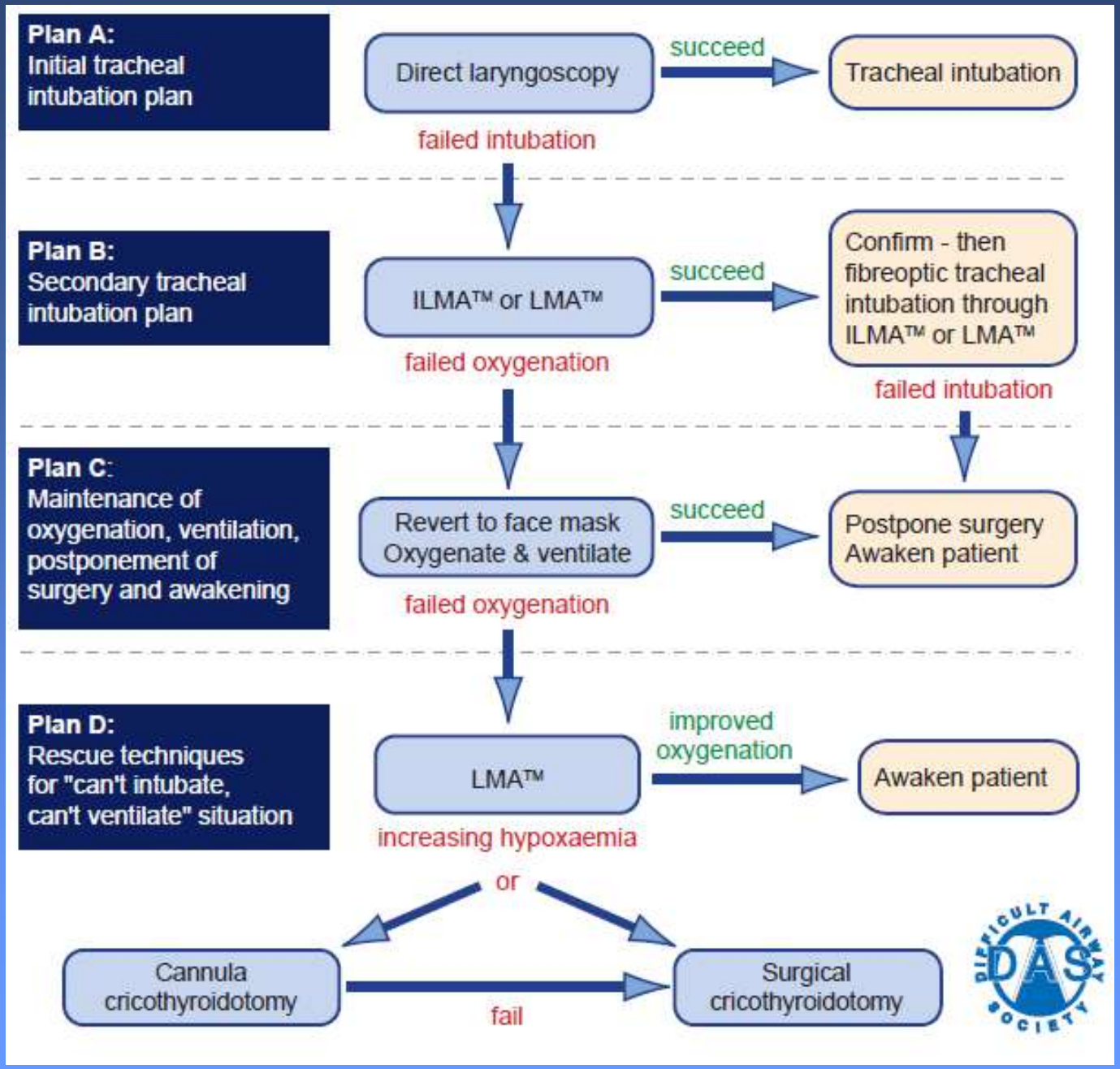
Equipment: Scalpel - short and rounded (no. 20 or Minitrach scalpel)
Small (e.g. 6 or 7 mm) cuffed tracheal or tracheostomy tube

4-step Technique:
1. Identify cricothyroid membrane
2. Stab incision through skin and membrane
   Enlarge incision with blunt dissection (e.g. scalpel handle, forceps or dilator)
3. Caudal traction on cricoid cartilage with tracheal hook
4. Insert tube and inflate cuff
   Ventilate with low-pressure source
   Verify tube position and pulmonary ventilation

Notes:
1. These techniques can have serious complications - use only in life-threatening situations
2. Convert to definitive airway as soon as possible
3. Postoperative management - see other difficult airway guidelines and flow-charts
4. 4mm cannula with low-pressure ventilation may be successful in patient breathing spontaneously

DIFFICULT AIRWAY DAS SOCIETY

Difficult Airway Society guidelines Flow-chart 2004 (use with DAS guidelines paper)


Plan A:
Initial tracheal intubation plan
Direct laryngoscopy
succeed
Tracheal intubation
failed intubation
Plan B:
Secondary tracheal intubation plan
ILMA™ or LMA™
succeed
Confirm - then fibreoptic tracheal intubation through ILMA™ or LMA™
failed oxygenation
failed intubation
Plan C:
Maintenance of oxygenation, ventilation, postponement of surgery and awakening
Revert to face mask Oxygenate & ventilate
succeed
Postpone surgery Awaken patient
failed oxygenation
Plan D:
Rescue techniques for "can't intubate, can't ventilate" situation
LMA™
improved oxygenation
Awaken patient
increasing hypoxaemia
or
Cannula cricothyroidotomy
fail
Surgical cricothyroidotomy
DIFFICULT AIRWAY SOCIETY
DAS

Moje iskustvo

- Brighton General Hospital, 4-ta godina specijalizacije
- 3:00 ujutro
- Pacijent, 40 god.,5 dana posle tonzilektomije – pljuje krv, ne moze da legne, tahikardičan, ali nije dekompenzovan
- Anesteziolog mu je posle tonzilektomije rekao da ima ‘usko grlo’

Problemi

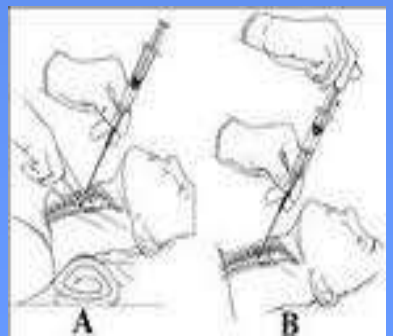
- Anksiozan pacijent
- Naginje hemodinamskom kolapsu
- Airway: edematozan, pun krvi I salive, evtl. primarno teška intubacija

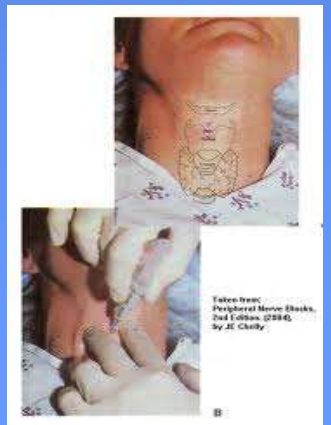
Plan

- A: inhalaciona indukcija u polusedećem položaju, kada dovoljno duboka, pogled laringoskopom da se proceni situacija
- B: Krikotiroidni set spreman sa jet ventilatorom
- C: ORL hirurg opran i spreman da uradi hitnu traheostomu

A u praksi…

- Direktna laringoskopija: uzak farinks pun krvi ali se vide mehurići vazduha iz dubine i naslućuju se glasne žice
- Da bih olakšao intubaciju – dajem 50mg Skolina- **GREŠKA –** gubim mehuriće kao vodič i posle 3 pokušaja ne uspevam da intubiram
- Krikotiroidna punkcija i jet ventilacija tokom hemostaze – na kraju ipak traheostoma - intenzivna nega






Some holes due
to active failures
Some holes due to
latent conditions

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Plan

- A
- B
- C

H V A L A