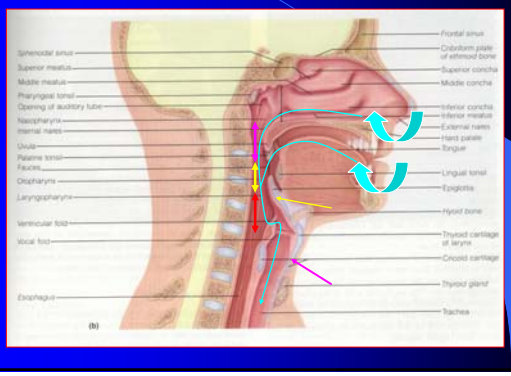
# Advanced Airway Life Support

實用高級氣道處置

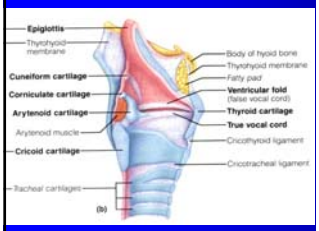
## AALS Training Course

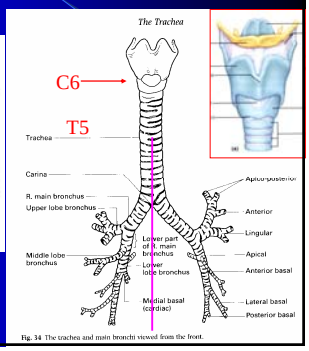
- Airway anatomy
- RA & RF
- Prediction of difficult airway
- Open airway
- Algorithm
- RSI, Sellick maneuver
- Airway devices
- One lung ventilation
- BVM, Basic Airway
- LMA
- Intubation, Tube Exchanger
- Combitube
- Trachlight, FOB
- Retrograde
- Cricothyrotomy
- PTIS

## Airway Anatomy

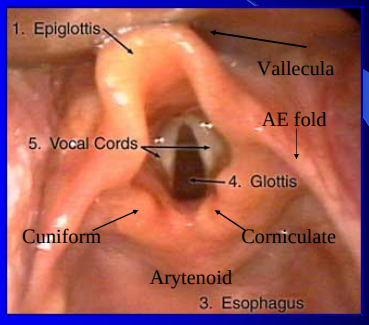


## Airway Anatomy




## Airway Anatomy

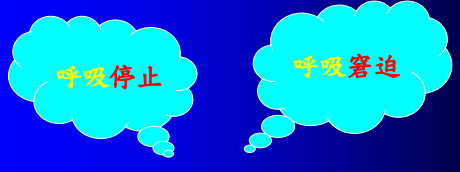



## RA vs RF

RA : Respiratory Arrest

RF : Respiratory Failure, Distress

Dyspnea



## Check Breathing

依基本氣道處理原則，必須先打開呼吸道，再評估有無呼吸。

Open airway

3L (Look , Listen , Feel )

無呼吸 → RA → 需緊急處理

有呼吸 → RF → 評估呼吸功能

- Stable
- Unstable
- bradypnea
- tachypnea

## Unstable

呼吸型態改變
意識形態改變
血氧濃度降低
血壓心跳變化
發生氣道阻塞
理學檢查發現

淺
快
RF
費力
不協調
痰多

## Prediction of difficult airway

Difficult Mask

↓

Difficult Laryngoscopy

↓

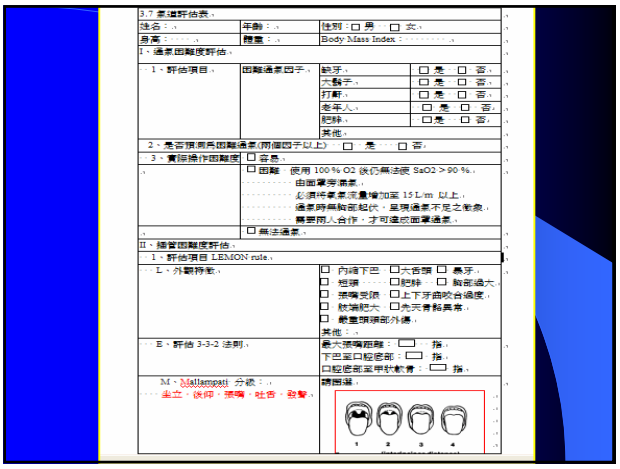
Difficult Intubation

困難氣道處置發生機率

| 困難氣道處置種類 | 發生機率 |
|---|---|
| 單純困難面罩通氣 | 無資料 |
| 困難插管<br>(difficult intubation) | 1%-4% |
| 無法插管或插管失敗<br>(failed intubate or impossible intubate) | 0.13%-0.3% |
| 困難面罩通氣且困難插管<br>(difficult ventilate且difficult intubate) | 1.5 % |
| 困難面罩通氣且無法插管<br>(difficult ventilate, impossible intubate) | 0.01-0.03% |
| 無法面罩通氣且無法插管<br>(cannot ventilate且cannot intubate) | 約五千分之一 |

## LEMON Rule

- L — Look externally
- E — Evaluate 3-3-2 rule
- M — Mallampati classification
- O — Obstruction ?
- N — Neck mobility



3.7 氣道評估表

| | | |
|---|---|---|
| 姓名： | 年齡： | 性別：□ 男 □ 女 |
| 身高： | 體重： | Body Mass Index： |

I、通氣困難度評估

| | | | |
|---|---|---|---|
| 1、評估項目 | 困難通氣因子 | 缺牙 | □ 是 □ 否 |
| | | 大鬍子 | □ 是 □ 否 |
| | | 打鼾 | □ 是 □ 否 |
| | | 老年人 | □ 是 □ 否 |
| | | 肥胖 | □ 是 □ 否 |
| | | 其他 | |
| 2、是否預測兩外困難通氣(兩個因子以上) | | | □ 是 □ 否 |
| 3、實際操作困難度 | □ 容易 | | |
| | □ 困難：使用 100 % O2 後仍無法使 SaO2 > 90 %<br>由面罩穿漏氣<br>必需將氣流流量增加至 15 L/m 以上<br>通氣時無胸部起伏，呈現通氣不足之徵象<br>需要兩人合作，才可達成面罩通氣 | | |
| | □ 無法通氣 | | |

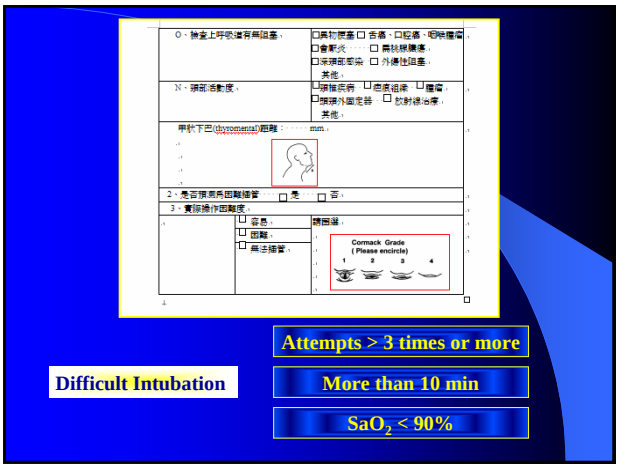
II、插管困難度評估

1、評估項目 LEMON rule

| | |
|---|---|
| L、外觀特徵 | □ 內縮下巴 □ 大舌頭 □ 暴牙<br>□ 短頸 □ 肥胖 □ 鬍鬚過大<br>□ 張嘴受限 □ 上下牙齒咬合過度<br>□ 扁頭顱大 □ 先天骨骼異常<br>□ 嚴重頭頸部外傷<br>其他： |
| E、評估 3-3-2 法則 | 最大張嘴距離：□ 指<br>下巴至口腔底部：□ 指<br>口腔底部至甲狀軟骨：□ 指 |
| M、Mallampati 分級 | 請圈選 |

坐立、後仰、張嘴、吐舌、發聲





O、檢查上呼吸道有無阻塞

□異物阻塞 □ 舌癌、□腔癌、咽喉腫瘤
□會厭炎 □ 扁桃腺腫塞
□深頸部感染 □ 外傷性阻塞
其他

N、頸部活動度

□頸椎疾病 □癌症追蹤 □腫瘤
□頭頸外科定器 □ 放射線治療
其他

甲狀下巴(thyromental)距離：mm

2、是否預測兩外困難插管 □ 是 □ 否

3、實際操作困難度

□ 容易
□ 困難
□ 無法插管

請圈選

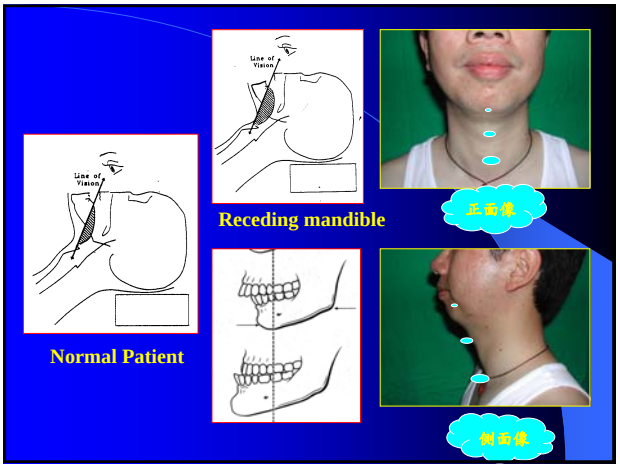
Cormack Grade (Please encircle) 1 2 3 4

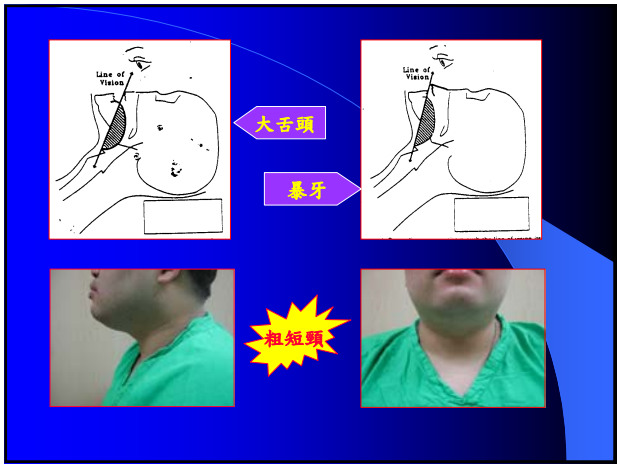
**Difficult Intubation**

**Attempts > 3 times or more**

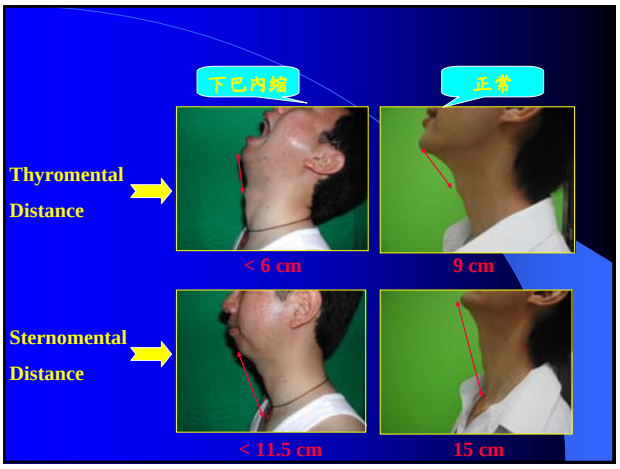
**More than 10 min**

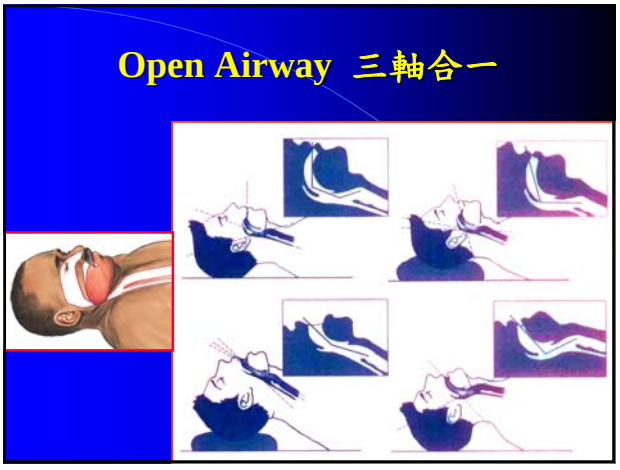
**$SaO_2$ < 90%**



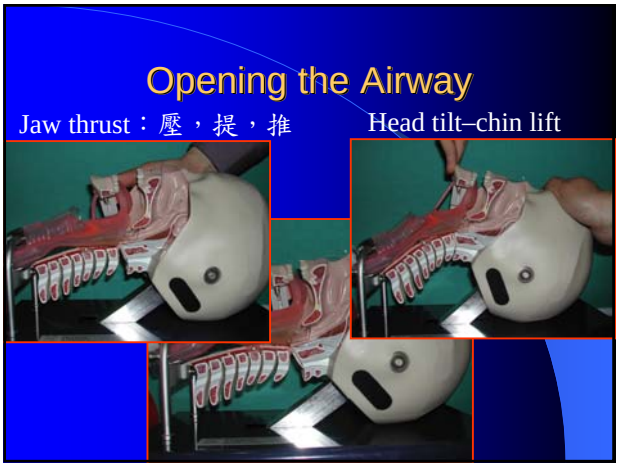






下巴內縮
正常
Thyromental Distance
< 6 cm
9 cm
Sternomental Distance
< 11.5 cm
15 cm


Open Airway 三軸合一


Opening the Airway
Jaw thrust：壓，提，推
Head tilt–chin lift


Opening the Airway
Jaw thrust：壓，提，推
Head tilt–chin lift


Opening the Airway
難易度
頸椎保護
使用時機

## Opening the Airway

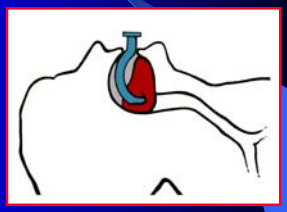
Sniffing Position

Wedge Shape

## Oropharyngeal airway；Oral airway

正確位置與長度

太短



## Nasopharyngeal Airway Insertion

長度：鼻尖至耳垂或下頷骨角之距離

管徑大小：恰可塞滿鼻孔，不致太緊

男性 7.5-8#

女性 6.5- 7#

## Nasal vs Oral airway

| | 鼻咽呼吸道(Nasal airway) | 口咽呼吸道(Oral airway) | |
|---|---|---|---|
| 種類 | | Guedel | Berman |
| |  1.4.37 |  1.4.38 |  1.4.39 |
| 柔軟度 | soft | Semirigid | |
| 材質 | Polyvinyl chloride (PVC) | nontoxic polyethylene | |
| 顏色 | 半透明 | Color-coded-size | |
| 通氣管道 | 1(central) | 1(central) | 2(side) |
| 刺激性 | +/-<br>刺激較小 | ++，對半昏迷病人刺激性大，會引起咳嗽、嘔吐、支氣管經攣(bronchospasm) | |
| Laryngospasm | +/- | +/- | |
| 外傷及出血 | ++<br>對鼻道 trauma 大，常會引起黏膜出血或鼻甲受傷 | +/- | |
| 使用時意識狀態 | 半昏迷，清醒(Semiconscious to-clear) | 昏迷(coma) | |
| 使用限制 | 凝血功能異常<br>鼻畸形 nasal deformity<br>顱底骨折禁用 | 半昏迷，清醒病患避免使用 | |

## 氣道處理流程

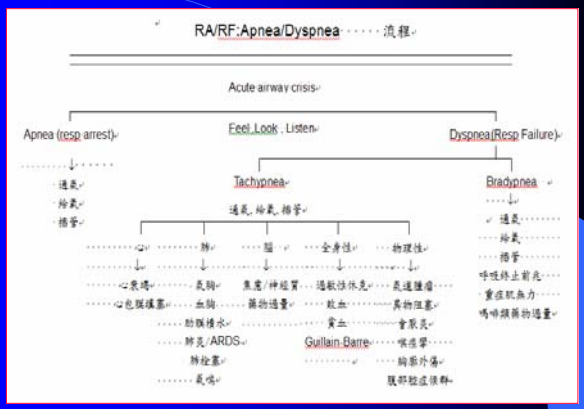
ASA Difficult Airway Algorithm

RA/RF Algorithm

Difficult Mask Algorithm

Intubate-Ventilate Algorithm

All in one Algorithm



插得進 擠得進 → Normal Practice

插不進 擠得進 → Other airway device

插得進 擠不進 → Bronchodilator, Steroid

插不進 擠不進 → Combitube, Cricothyrotomy
Tracheostomy

## BVM (Bag-Valve-Mask)


BVM → 3 C



## Bagging



單人操作

skill

less effective

700 cc

雙人操作

easy

more effective

1200-1500 cc

## Difficult Mask Ventilation

| | |
|---|---|
| Obesity | Use airway |
| Snoring | size |
| Beard | Two hands |
| Lack of teeth | Mask strap |
| Laryngospasm | Special method |

## Laryngeal Mask Airway

LMA ⟷ 喉罩

AALS

喉罩

口罩
眼罩
面罩
胸罩

LMA

Dr. Brain

| LMA大事記 | |
|---|---|
| 1981 | LMA第一次在人體使用 |
| 1983 | 第一篇醫學文獻發表 |
| 1990 | 全英國開刀房開始使用 |
| 1991 | 美國FDA認可使用 |
| 1993 | 美國麻醉醫學會(ASA)列入困難氣道處置流程 |
| 2000 | ACLS列為class IIa 氣道處理 |

## LMA Series

Unique
Classic
Fastrach
Proseal
Flexible

Purpose

Ventilation device

Intubation assist

Fastrach

Blind

FOB

Size

Volume

As suggested

Max. Volume:
(size – 1) x 10 ml

Pediatric: #3
Female : #3-#4
Male: #5

Large size, Less pressure

| Advantage | Limitation | Complicaiton |
|---|---|---|
| Simple | Mouth open < 2 cm | Trauma |
| Easy to learn | Regurgitation | Bleeding |
| Easy to use | Obstruction | Laryngospasm |
| Fast | Poor compliance | Aspiration |
| Reuse | Tumor | Leakage |
| Intubaton | Surgery | Supraglottic edema |

## Endotracheal Intubation

## ETT

| Oral | Nasal |
|---|---|
| Awake or sedated | Awake or sedated |
| Laryngoscopy | Laryngoscopy |
| LMA, Fastrach | Blind |
| FOB | FOB |
| Trachlight | Trachlight |
| Retrograde | Retrograde |


## BURP

Backward-Upward-Rightward Pressure
Over Thyroid Cartilage

4.7 % → 1.8 %

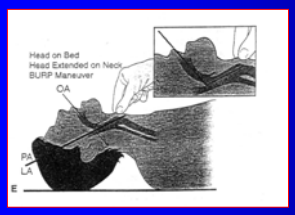
Backward

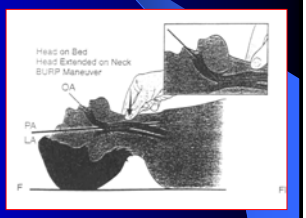
Upward

Rightward

AALS

BURP




向前上提

手腕旋轉

AALS

Call Help

BURP

Sniffing Position

Difficult Intubation

白色Stylet

Change Position
再墊頭

Algorithm

FOB, LMA, combitube, surgical airway

## *Laryngoscope Set*

## *Laryngoscope Handle Series*

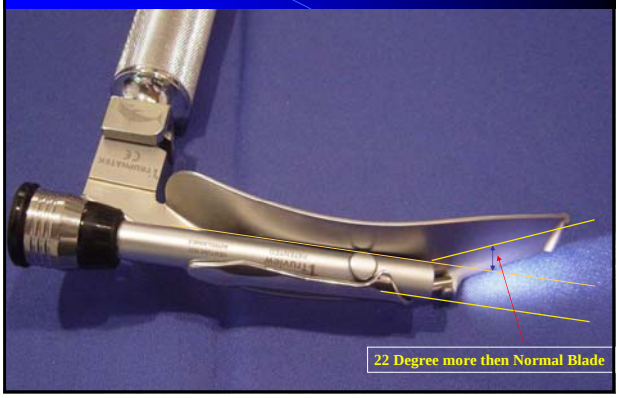

## *Laryngoscope Blades Series*

## Dolphin VS Green Spec. System Laryngoscope

## *Flex-Tip(McCoy) Laryngoscope Set*

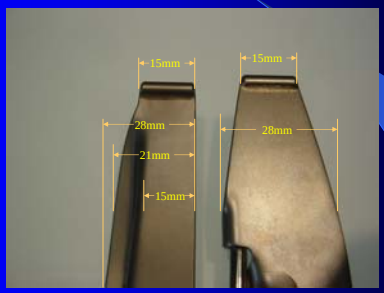
## Truview Laryngoscope Set


## *The Truview Laryngoscope Visual Field*




## *The Truview Laryngoscope Blade*

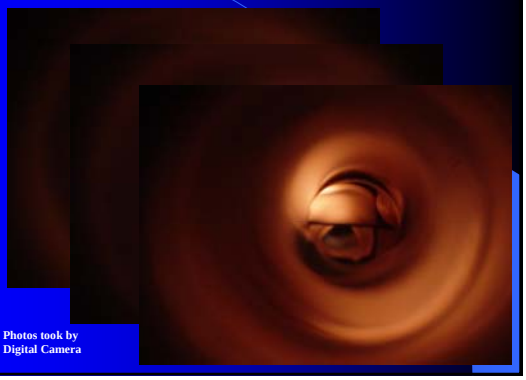

## *TruView Blade vs Normal Blade Width*



## *The Laryngoscope Intubating*

**Truview Laryngoscope Intubating**


## *TruView Laryngoscope Intubating*



Photos took by
Digital Camera

## *TruView Laryngoscope Application*

**Truview + CCD Camara System**

適用於開刀房內各種廠牌的影像放大系統
臨床及教學兩相宜

## *TruView Laryngoscope Application*

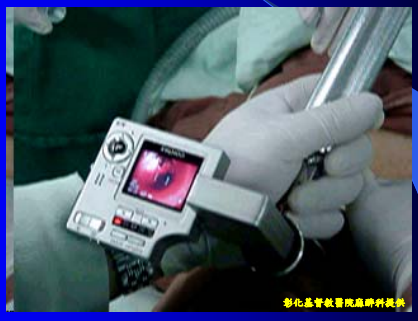
**Truview + Digital Camera**

- 數位相機螢幕可放大影像，插插管更容易
- 隨時可照相、錄影與記錄插管過程建立與教學
- 相機螢幕可隨操作者的習慣，可轉至操作者的
- 左邊或右邊
- 組裝簡單、輕巧易攜帶
- 超值型插管教學工具

數位相機規格:
1. 317萬畫素
2. 廣司鏡片
3. Zoom光學3倍、數位2倍=6倍
4. 1.5" TFT monitor
5. 適用SD 或 MMC 記憶卡
6. 錄影功能像素:最高640*480 (30fps)
7. Monitor角度可旋轉270˚，可任意調整位置及適合的插管角度
8. 體積小、重量輕：只有125g，不會增加插管的負擔

## *TruView Laryngoscope Intubating*

**Video**



彰化基督教醫院麻醉科提供

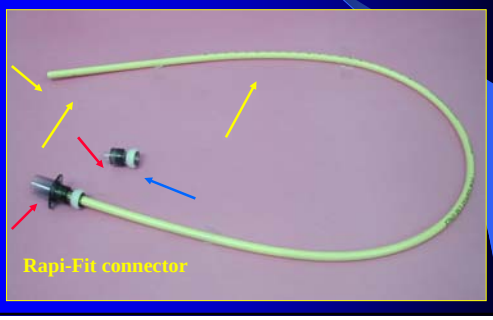
# Tube Exchanger

**情境模擬：**

呼吸加護中心病患，先前插管時非常困難，因氣管內管氣囊破裂，導致使用呼吸器時異常漏氣，必須更換氣管內管

⇨如何處理

舊管 Tube Exchanger 新管




## Tube Exchanger

| Advantage | Limitation |
|---|---|
| Ventilation, oxygenation | Lubrication |
| Easy use | Limit in same route |
| Safe | Pull out EET |
| Blunt tip | Push down sputum |
| Length marker | |

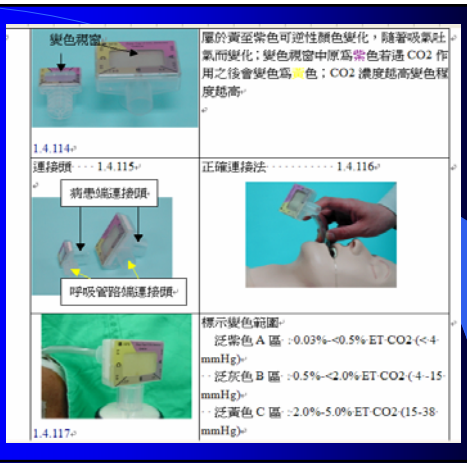
## Confirmation of EET

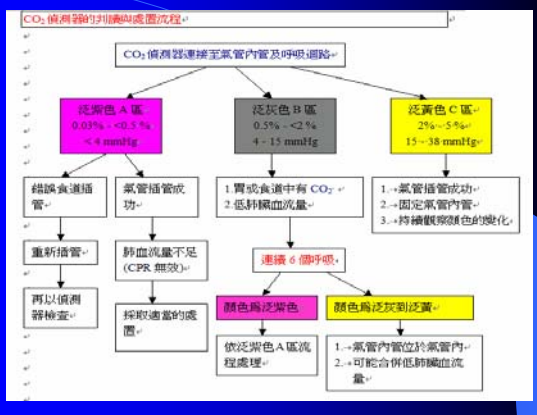
2000 ACLS

- EID
  - Bulb type
  - Synrige
- $ETCO_2$
  - Capnography
  - Detector

Bulb type

Capnography



# RSI

# Rapid Sequence Intubation

# 快速插管

## RSI : 6 P

| | |
|---|---|
| Prepare | IV, monitor, instrument, suction |
| Preoxygenation | 100 % $O_2$, Denitrogenation |
| Premedicaiton | BZD, barbiturate, lidocaine… |
| Pressure | Sellick maneuver |
| Paralysis | Muscle relaxant |
| Pass tube | Direct vision, BURP |

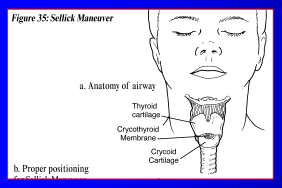
## Sellick Maneuver

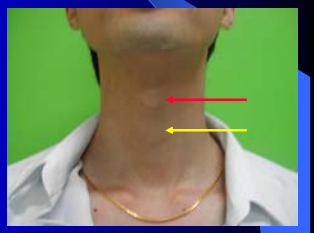
Cricoid Pressure

Prevent Aspiration

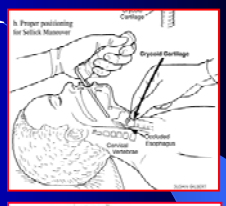
## Cricoid Cartilage

## the movable one



## Sellick Maneuver



## Sellick Maneuver

### Mechanism

Prevention :
- regurgitation
- aspiration

100 $cmH_2O$

### Priority

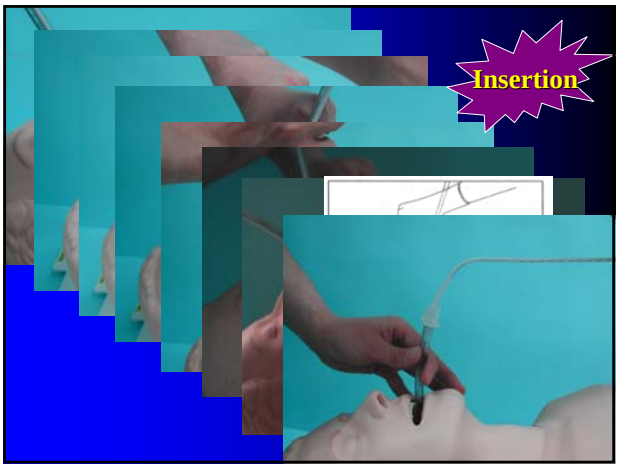
- Not NPO
- Pregnancy
- Intra-abdominal P.
- Hiatal hernia
- Achalasia
- Post gastrectomy
- SARS

### Complication

- C spine injury
- Laryngeal trauma
- Active vomiting

## Lighted Stylet

Trachlight




## Trachlight

**Advantage**

- Fast
- Easy practice
- Easy learning
- Simple instrument
- Less trauma

**Priority**

- Intubation
- Failure intubation
- CPR

**Complication**

- As intubation

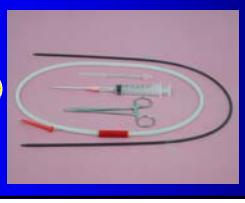
## Retrograde intubation

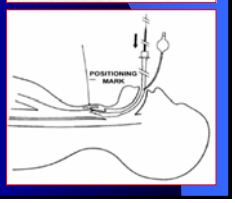
Cannot intubate、Can Ventilate

## Retrograde Intubating

CVP set

Retrograde set






## Retrograde

| Limitation | Priority | Complication |
|---|---|---|
| Experience | C spine | Laceration |
| Time consuming | Difficult airway | infection |
| Skillful | Cannot intubate | Trauma, hematoma |
| Local infection | -Can ventilate | Pneumo |
| Local tumor | | Nerve damage |
| Not identify | | |

## Cricothyrotomy

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## Cricothyroidotomy

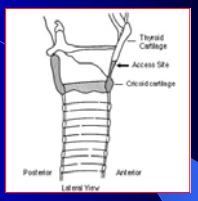
打洞

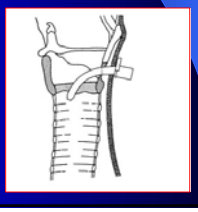
找不到洞

## Cricothyrotomy

cannot intubate、cannot ventilate

## Cricothyrotomy



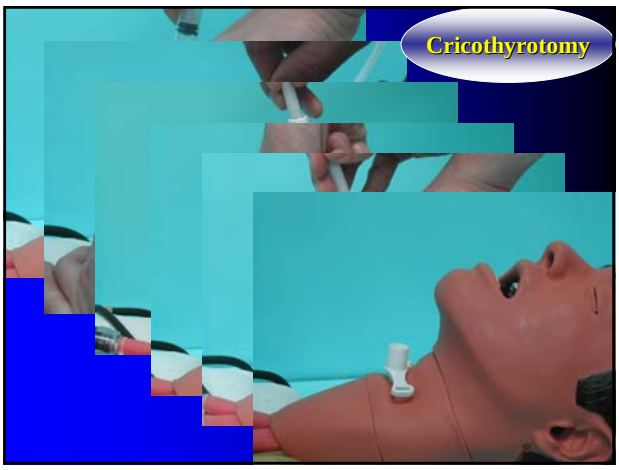
Melker Emergent cricothyrotomy

IV catheter

Patil Emergent cricothyrotomy

Surgical airway

## Cricothyrotomy



## Cricothyrotomy

| Limitation | Priority | Complication |
|---|---|---|
| < 12 y/o | Difficult airway | Laryngeal stenosis |
| Laryngeal Fx | Inaccessible airway | Voice change |
| Trauma, infection | Facial Fx | infection |
| tumor | Oral bleeding | Trauma, hematoma |
| | Cannot intubate | Pneumo |
| | -Can ventilate | Nerve damage |

## Separate Lung Ventialtion

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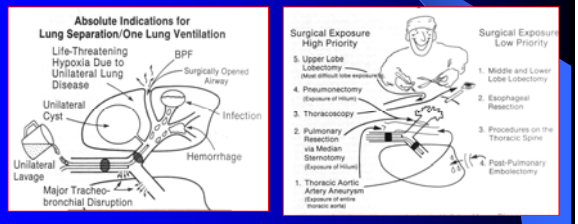
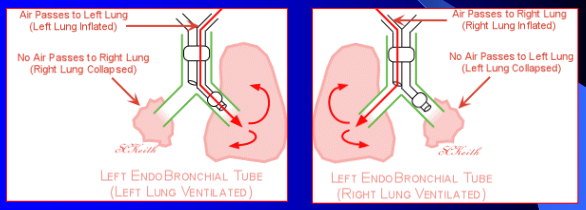
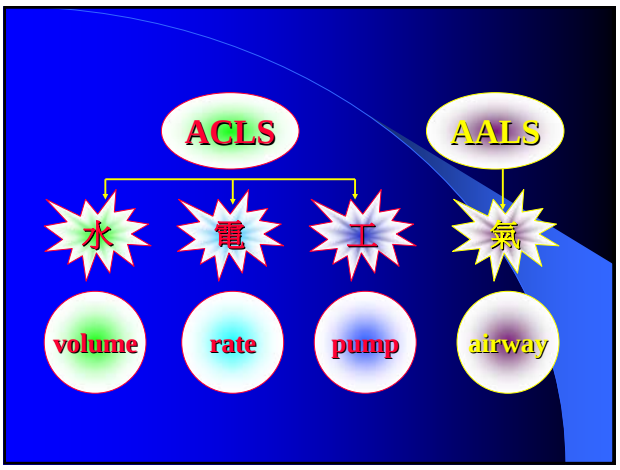
## One Lung Ventialtion

## One lung ventilation




## One Lung Ventialtion




SimMan

# Let's Play !