

Cricothyroidotomy

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Conference & Exhibition**



Cricothyroidotomy

Declaration

COOKMEDICAL

Cricothyroidotomy

Can't Intubate, Can't Ventilate

Incidence

Differential diagnosis

Physiology

Rationale

Ideal technique

Anatomy

Management

Options

Evidence

Recommendations

Videos

Cricothyroidotomy

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Incidence

- | | | |
|------------------------|---------------------------------|-----------------|
| • 1: 10 000 GAs | (Benumof J 1989; Nagaro T 2003) | } LMA
effect |
| • 1: 50 000 GAs | (Kheterpal S 2009) | |
| • 1:50 ↓ to 1:500, A+E | (Chang R 1998) | } RSI |
| • 1: 500, A+E | (Graham C 2003) | |

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Differential diagnosis

- Obstructed upper airway
- External compression natural airway – cricoid pressure
- Airway device misplacement, occlusion – kink, cuff, FB
- Breathing system occlusion / misassembly – valves, filter, FB
- Lower airway pathology –
mucus plug, asthma, anaphylaxis, asp, mediastinal mass, Px

NB: Before diagnosing AIRWAY OBSTRUCTION –

Insert SAD (pref. 2nd generation – higher leak pressure / aspiration
°cricoid P, ?patency a/w device, simplify circuit, listen, examine pt

Cricothyroidotomy

Rationale

- Supra-glottic oxygenation has failed
- Trans- glottic oxygenation has failed
- Sub-glottic oxygenation is *only* option, but where?

Cricothyroid

Superficial; ↓Cx

Palpable

Rel. avascular

Not covered

Access quick / core skill

Cricoid: profile

(cardio-pulmonary bypass)

OR

Trachea

deep; ↑Cx

less so

tiger country

thyroid isthmus

slow - & surgical – ENT/MF: not core

no 360° support / post oeso. protection



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Ideal technique

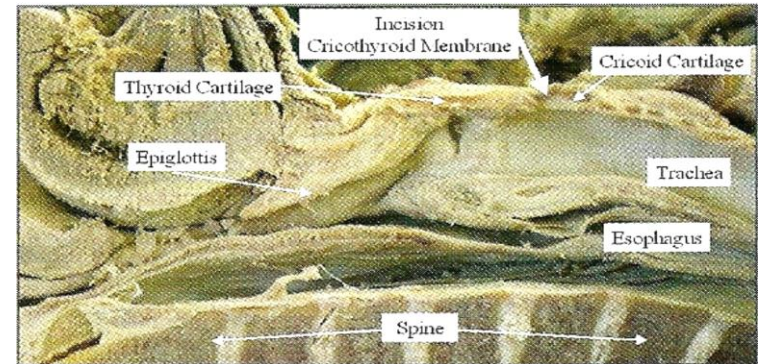
- Quick
- Simple (steep learning curve with skill retention)
- Effective oxygenation
- Effective ventilation (& ETCO₂ confirmation possible)
- Applicable to all patients (14% insp. + exp. URTO) Vanner 2004
- Low complication rate (insertion and use)
- Readily available, cheap, disposable, long shelf-life kit
- Non-surgical skills
- Protects airway / allows airway toilet
- Manikin practice

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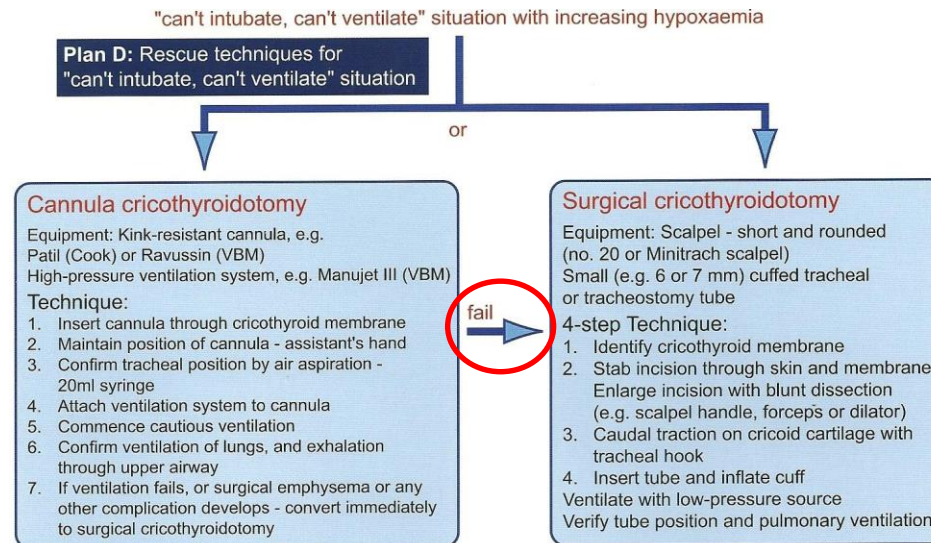
Anatomy

- CTM 9 (5-12) x 24 (22-30) mm
- Medial ligament (9mm)
- Lateral CT muscle
- Tube must have ext dia < 8 mm
- Doesn't calcify with age
- VCs 1cm above lower thyroid cartilage
- Superior 1/3rd crossed by CT Art (from thyroid art)
- Also crossed by Inf. thyroid v and ant. jugular v



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

SPECIAL ARTICLE

Difficult Airway Society guidelines for management of the unanticipated difficult intubation

J. J. Henderson,¹ M. T. Popat,² I. P. Latto³ and A. C. Pearce⁴

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Management

Indications for 'front-of-neck-action'

- CICV

DAS guideline says with hypoxia +/- bradycardia,
but

hypoxia / ↓HR is inevitable in CICV – waiting can only ↑ death / BD

Make the diagnosis ASAP & act accordingly

Frerk 2006

- Anticipated CICV in patients with difficult airways

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Management

Contra-Indications

- **Absolute: NONE** – haven't attempted SAD / ETT
- **Caution: 14% URTO is insp. & exp.** – NOT narrow bore
Children – use needle-only < 8yr (cricoid)
- **Technical: *no front-of-neck access*: massive thyroid, lymphoma, other anterior masses**
(may necessitate trach or avoid neck completely eg AFOI, CPB)
- **Cannot palpate CTM** – 3 finger breadths > sternal notch; ?USS
- **Laryngeal trauma** – but what's the alternative?
- **Coagulopathy** – only with elective placement
- **Inexperienced doctor** – few are



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Management

Options

- Narrow bore cannula ($\leq 3\text{mm}$, usually $\leq 2\text{mm}$) with JET
- Wide bore cannula ($\geq 4\text{mm}$); Seldinger / non-Seldinger
- Surgical – OPEN – standard tubes (usually $\geq 5\text{mm}$ +/- cuff)

Many see them as equally useful (in anaesthesia)

Choice seen as a matter of personal discretion... see later

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Management

Narrow bore cannula – 'needle cric'

- Extend cleaned H&N – rolled towel under shoulders
- Immobilise larynx – grasp thyroid cartilage with L hand
- Puncture inferior border CTM – aim caudally 30-45° (↓kinking)
- Aspirate air (clot, bleeding, gastric fluid, mucus)
- Advance cannula
- Withdraw needle & check aspirate air (ETCO₂ if possible)
- Use purpose-made devices: Teflon, not PVC
 - multiple side-holes
- **Upper airway MUST allow passive exhalation**
- Use Guedel, NPA, SAD, jaw thrust etc. & listen



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Management

Wide bore cannula

- Percutaneous Seldinger or direct cannula-over-needle
- Extend cleaned H&N – rolled towel under shoulders
- Immobilise larynx – grasp thyroid cartilage with L hand
- 'Quicktrach' & Melker:



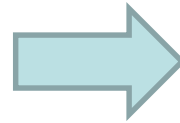
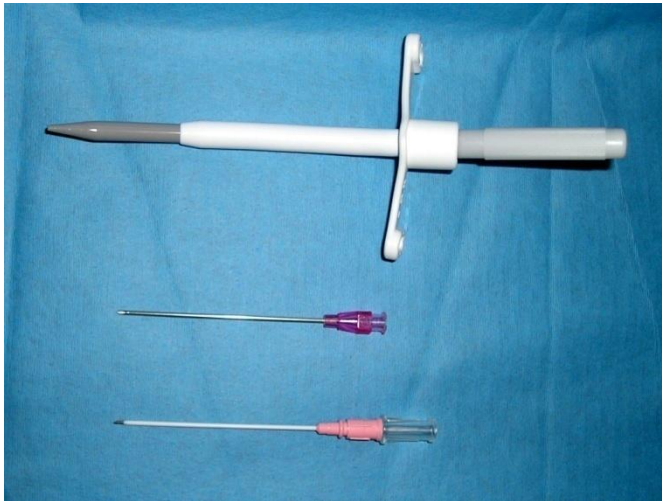
- Techniques familiar to anaesthetists
- Effective Vm via conventional breathing system
- Royal Army Medical Corps – Quicktrach – Melker (?open now)
- but, multiple attempts, bleeding, PTHx, s/c emphysema, SLOW

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Management

Melker cannula



6.0mm uncuffed Melker

AH

Patient J

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Management

Open - surgical

- Extend cleaned H&N – rolled towel under shoulders
- Immobilise larynx – grasp thyroid cartilage with L hand
- Incise skin; no 11 blade: midline-vertical-4cm over TC/CTM/ CC
- Blunt subcutaneous dissection with forceps
- Incise CTM – lower ½; horizontal
- CRICOID HOOK ventral & caudal traction
- +/- bougie
- Trach tube / ETT from side & rotate into chest
- Inflate cuff; ETCO₂, FOS
- Secure
- Convert to formal trach (within 72 hours)



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Management

Open – surgical: RAPID 4 STEP TECHNIQUE

- Identify CTM
 - Transverse incision - skin & CTM; enlarge it
 - Cricoid hook caudal traction
 - Insert trach tube
-
- Quicker, but more Cx

'OPEN CRIC should be CORE SKILL'
demanded by RCA'

Tighe & Henderson 2004



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Management

Open – surgical

- **Advantages: all degrees of OB**
 - definitive enough to transfer to theatre
 - effective Vm
 - protects airway
 - suction
 - achieves re-oxygenation more quickly
- **Disadvantages: bleeding**
 - misplacement
 - s/c emphysema

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Evidence

UK data 2011

NAP4



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NAP4: Serious events = RIP / CRIC-TRACHE / ICU

- CRIC-TRACH attempts ----- GA = 58 (1/50 000 GAs)
ICU = 12
AED = 10
- GA: 43/58 involved head & neck surgery
- GA: 33/58 – anaesthetist deferred to surgeon in CICV – **ALL worked!**
- GA: 25/58 – anaesthetist managed CICV – 9 worked
 - 11 surgical rescue - trachs
 - 3 rescued by intubation
 - 1 rescued by anaes PDT
 - 1 RIP

Anaesthetists mainly used needle CRIC

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Evidence

NAP4: What anaesthetists do

- **Narrow bore: 19 patients: 12 FAILED (63%)**
 - 7 rescued by surgical trach
 - 3 rescued by intubation
 - 1 rescued by open cric
 - 1 died
- **Wide bore: 7 patients: 3 FAILED (43%)**
 - 1 rescued by intubation
 - 1 rescued by percutaneous trach
 - 1 rescued by surgical trach
- **Open cric: 1 patient: 1 'FAILED' ----but was in airway---PTHx**

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Evidence

Why is it so problematical?

- **Emergency: No technique PRCT (blind) – lab studies / case series equipment /sufficiently senior team not to hand (OOH)**
- **Rarely encountered so difficult to recognise & build experience**
- **Biggest single group – head & neck – trained surgeons ready**
- **Can't practice on pts**
- **Manikins poor substitute**
- **Animals rarely available & not identical**
- **We deny CICV: lack of situational awareness – USA Closed Claims**
- **We panic – cool-headed leadership difficult in iatrogenic condition**
- **Numerous different pieces of kit – not compared in the field**
- **Some still construct bespoke kits**

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Evidence

Why is it so problematical?

- Poor induction programmes
- Skill fade
- Team training rare
- Often, a glib approach to cric – ignoring real issues (reg'ly ID CTM)
- Patients in whom it happens are NOT normal: fat/airway pathology
- ? difficult FMV = difficult SAD = difficult intubation = difficult cric

A Heard. Anaes 2009

- If difficult landmarks:
- Open cric with extended incision
- Subsequent blunt finger dissection to ID CTM
- Bleeding risk < need to establish airway

Shannon et al

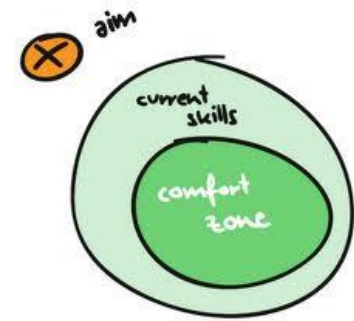
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Evidence

Why is it so problematical?

- Do we choose poor techniques?
- Open vs rest = no consensus
- Anaesthetists don't like 'surgical' techniques
- Anaesthetists who do PDTs like Seldinger
- Open proponents say it's simple & quick & it works!
- NAP4: **'the possibility that cannula cricothyroidotomy is intrinsically inferior to a surgical technique should be considered. All anaesthetists should be trained to perform a surgical airway.'**



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Evidence

Why is it so problematical?

- **Do we choose poor techniques?**
- **NAP4: some may use this project as reason to abandon needle cric - but no denominator data or precise reasons for failure**

**“Life begins at
the end of your
comfort zone.”**

- Neale Walsh

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What do you do?

Where's your kit?

Have you actually practiced / used it?

Have you practiced with your team?

Do *they* know where it is?

Can they help you?

BE PREPARED!

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Thank you