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Translating Nutritional
Science to Good Health

*Airway complications on the general medical unit
after prolonged ICU admission*

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Tracheostomies

Introduction

Background

Uses and disadvantages

Techniques

Issues on the ward

Decanulation

Movie

Three facts that may shock you:

Movie

Three facts that may shock you:

- **That was not filmed at the Royal Adelaide Hospital ICU**

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- **Whiskey out of a flask is not used to sterilise equipment**

Movie

Three facts that may shock you:

- **That was not filmed at the Royal Adelaide Hospital ICU**
- **Whiskey out of a flask is not used to sterilise equipment**
- **Biros are not used as tracheostomy tubes**



Introduction

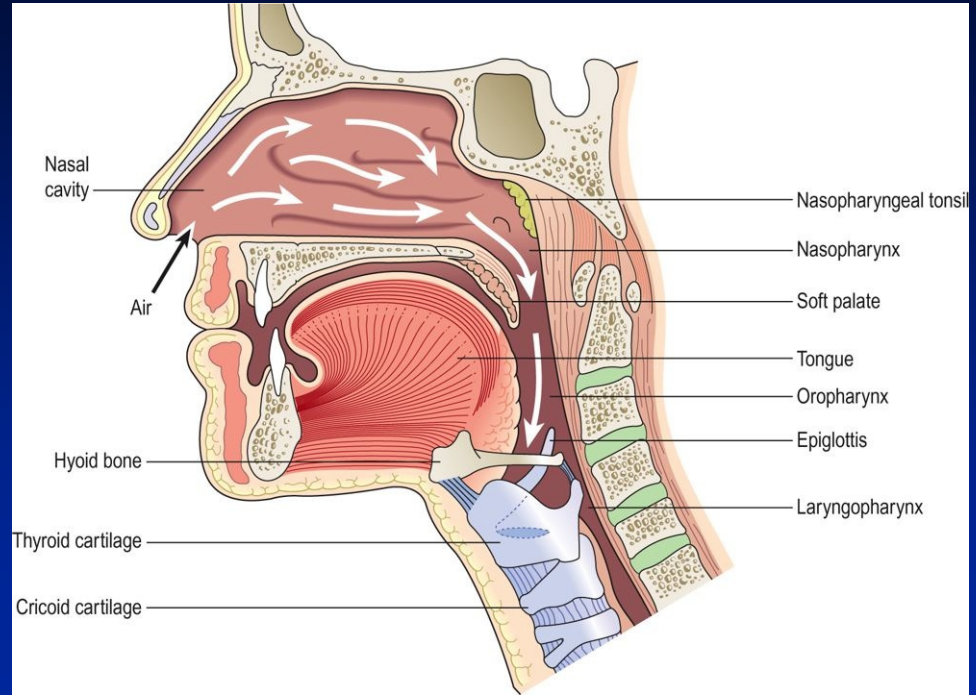
Advances in intensive care → increased patient survival in those who would have otherwise succumbed

Those requiring prolonged mechanical ventilation → tracheostomy

What is a tracheostomy?

What is a tracheostomy?

An airway that is inserted (subglottically) through neck tissues directly into the trachea



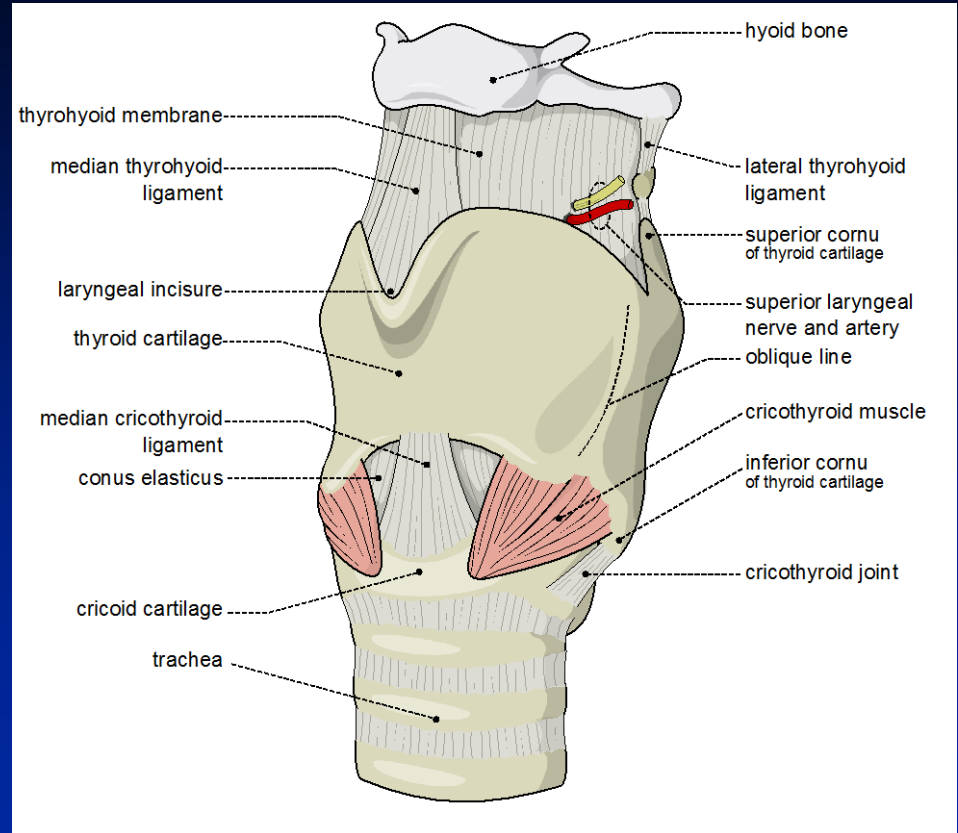
Types

Emergency (Crico-thyroid)

- Percutaneous (Needle)
- Surgical

Elective (Tracheal rings)

- Percutaneous
- Surgical



Tracheostomy tubes

Outer tube

**Inner tube – fits snugly into
outer tube**

**Flange – flat plastic plate
allows the tube to be secured**

Connector

Obturator



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Background

3600 BC – Seen on Egyptian tablets

2000 BC – Sacred hindu texts (“Rigveda”)

400 BC – Hippocrates – condemned the practice → unacceptable risk of carotid artery damage

Antonio Musa Brassavola

1546 – Performed the first documented successful tracheostomy

- Patient with laryngeal abscess

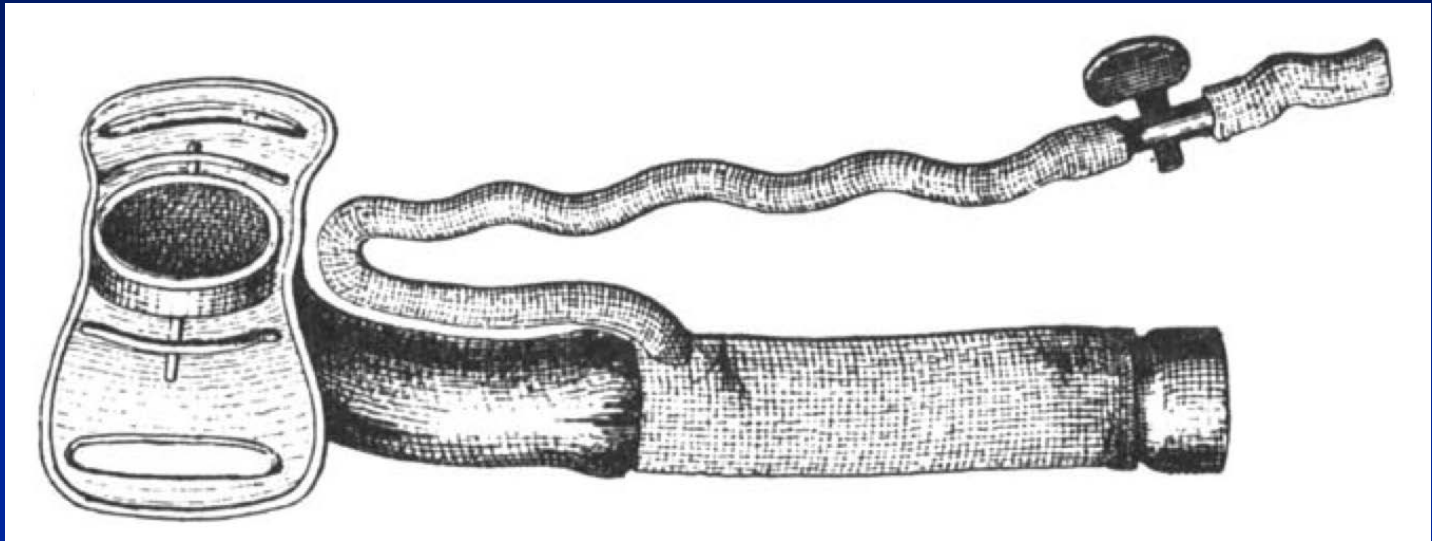




Scultetus J. Armamentarium chirurgicum bipartitum, (1666)

Friedrich Trendelenburg

- 1869 – First proposed the use of a cuffed tracheostomy tube



Chevalier Jackson

- 1909 – Described the current used surgical technique
- Emphasised post operative care



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Uses

Mechanical ventilation is expected to be prolonged

Uses

Mechanical ventilation is expected to be prolonged

- **Comfort/reduced sedation**
- **Decreases work of breathing**
- **Weaning off ventilator**
- **Communication**
- **Nursing care (mouth care and mobility)**
- **Ease of replacement of tracheal tube**
- **Facilitate transfer to the ward**

Disadvantages

Needs a surgical procedure

- **Inherent risks of invasive procedure**

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Needs a surgical procedure

- **Inherent risks of invasive procedure**

Early

Bleeding, pneumothorax, surgical emphysema, malposition, damage to local structures, death

Delayed

Infection, obstruction, ulceration, dysphagia, decanulation issues

Late

Stenosis, granuloma, persistent sinus, tracheomalacia

Disadvantages

Needs a surgical procedure

- Inherent risks of invasive procedure

Issues with speech/swallowing

Looks

Living with tracheostomy

Early

Bleeding, pneumothorax, surgical emphysema, malposition, damage to local structures, death

Delayed

Infection, obstruction, ulceration, dysphagia, decanulation issues

Late

Stenosis, granuloma, persistent sinus, tracheomalacia

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Techniques

Emergency

- Percutaneous (Needle)
- Surgical

Elective

- Percutaneous
- Surgical

Emergency

Surgical

Emergency

Surgical

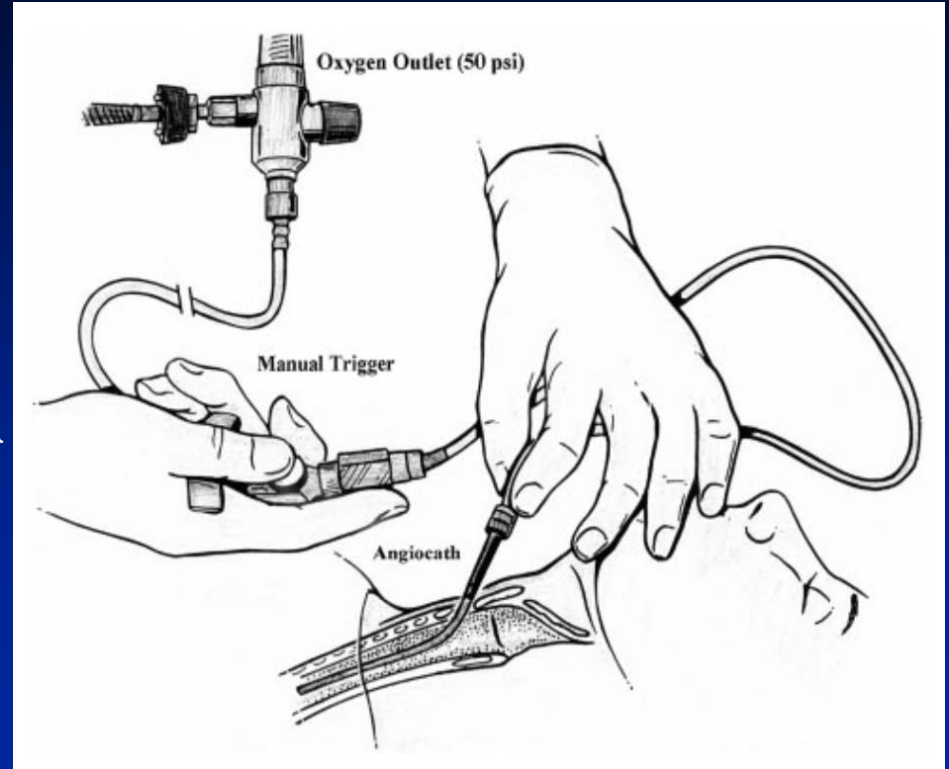
Percutaneous (Needle)

Emergency

Surgical

Percutaneous (Needle)

- Oxygenation
- Transtracheal Jet Ventilation



Elective

Surgical – surgical dissection down to trachea with insertion of tracheostomy tube for ventilation

Elective

Surgical – surgical dissection down to trachea with insertion of tracheostomy tube for ventilation

Percutaneous – different techniques to insert a tracheostomy

- **Gradual dilatation**
- **Forceps dilatation**

Surgical vs Percutaneous

Surgical:

Under direct vision

Better for difficult cases

Avoid aberrant vessels

Percutaneous:

Less bleeding

Quicker and cheaper

Can be done in the ICU

Can be performed sooner

Tracheostomy



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Issues on the ward

Respiratory distress

- **Blocked/displaced tube**

Bleeding

Respiratory distress

Respiratory distress

Tracheostomy tube

- **Blocked/displaced?**

Respiratory distress

Tracheostomy tube

- **Blocked/displaced?**
 - **Needs removal or replacement**
 - **Can you pass a catheter**

Respiratory distress

Tracheostomy tube

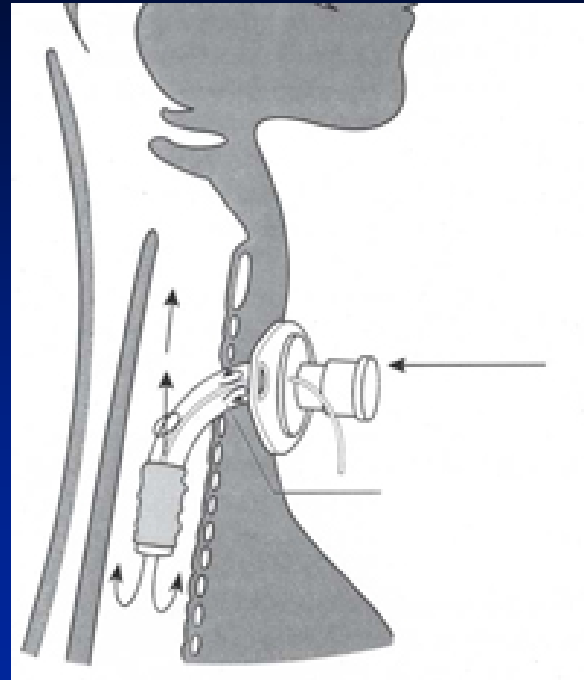
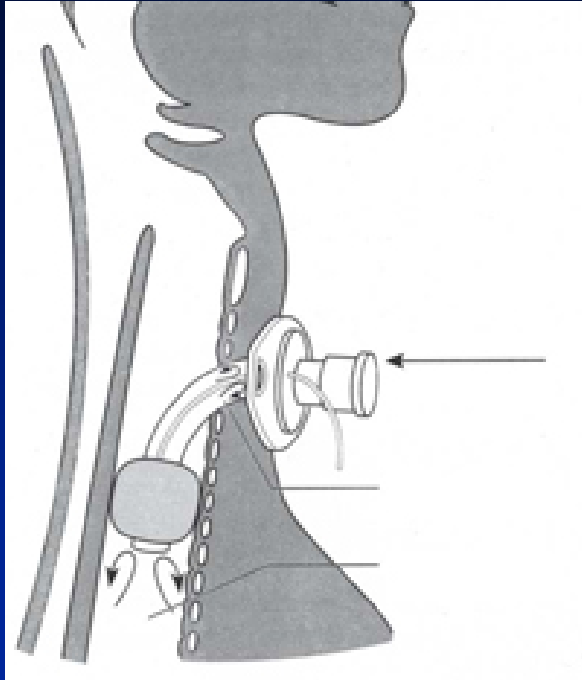
- **Blocked/displaced?**
 - **Needs removal or replacement**
 - **Can you pass a catheter**
- **Cuffed/uncuffed**

Respiratory distress

Tracheostomy tube

- **Blocked/displaced?**
 - **Needs removal or replacement**
 - **Can you pass a catheter**
- **Cuffed/uncuffed**
 - **Need a cuff for positive pressure ventilation**
 - **Look for a pilot balloon**

Cuffed/uncuffed tube



Respiratory distress

Tracheostomy tube

- Inner tube to be inserted? – ensure it fits
- When was tracheostomy performed?
 - Safe to reinsert tracheostomy tube if >7 days
- Intubate?
 - Laryngectomy or supraglottic pathology intubation not possible

Approach

ABCs

Breathing at mouth/tracheostomy

CPR if indicated

High flow oxygen to mouth/nose/stoma

Check if tracheostomy tube is patent

Look for other causes

Blocked/displaced tube

Remove tube

Oxygenation/ventilation

- **Mouth**
- **Stoma**

Consider

- **Endotracheal intubation**
- **Intubation of stoma – airway adjuncts + small tube (size 6.0)**

Issues on the ward

Respiratory distress

- **Blocked/displaced tube**

Bleeding

Issues on the ward

Respiratory distress ✓

- **Blocked/displaced tube ✓**

Bleeding

Bleeding

Bleeding

Early (peri-operative) bleeding

- More common
- Usually benign

Late bleeding

- Potentially life threatening

Causes

Specific to tracheostomy

Early (peri-operative) bleeding

- Suction/Manipulation

Late bleeding

- Granulation tissue
- Infection
- Tracheo-innominate fistula

Tracheo-innominate fistula



Tracheo-innominate fistula

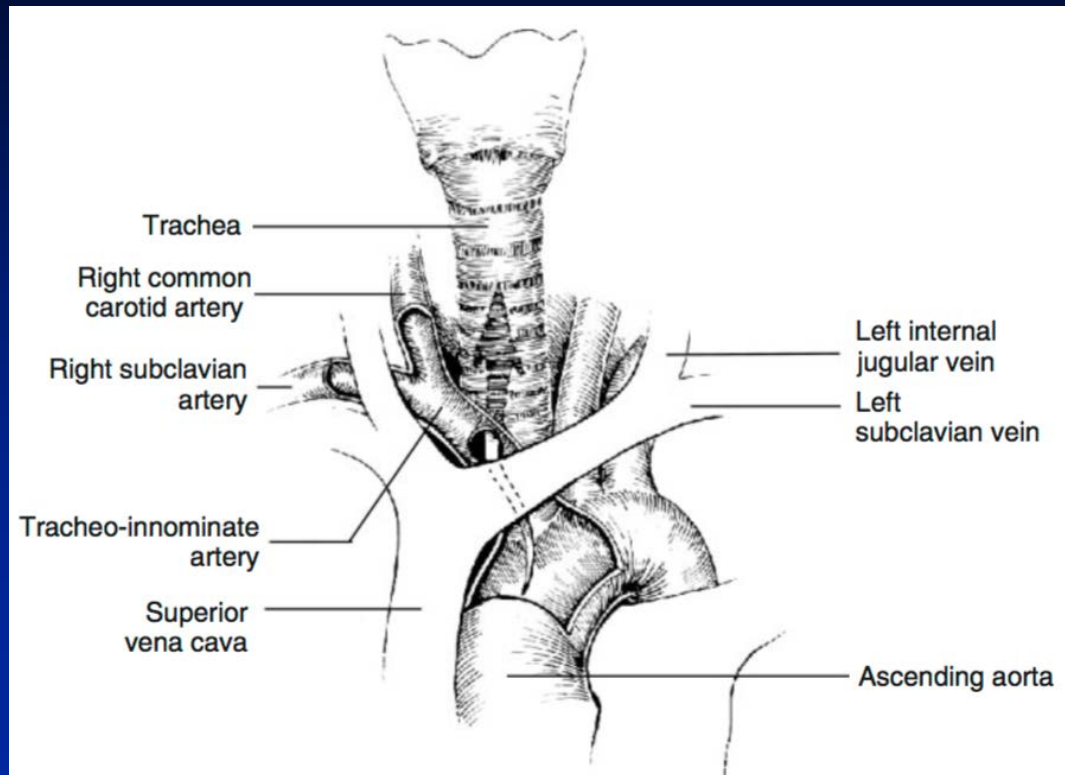
Pressure necrosis of anterior tracheal wall from tube causing erosion of trachea and innominate artery (brachiocephalic trunk)

- **Incidence <1%**
- **Survival 15%**
- **Mortality is 100% without surgical intervention**
- **75% develop within 3 weeks after tracheostomy**

Antomy

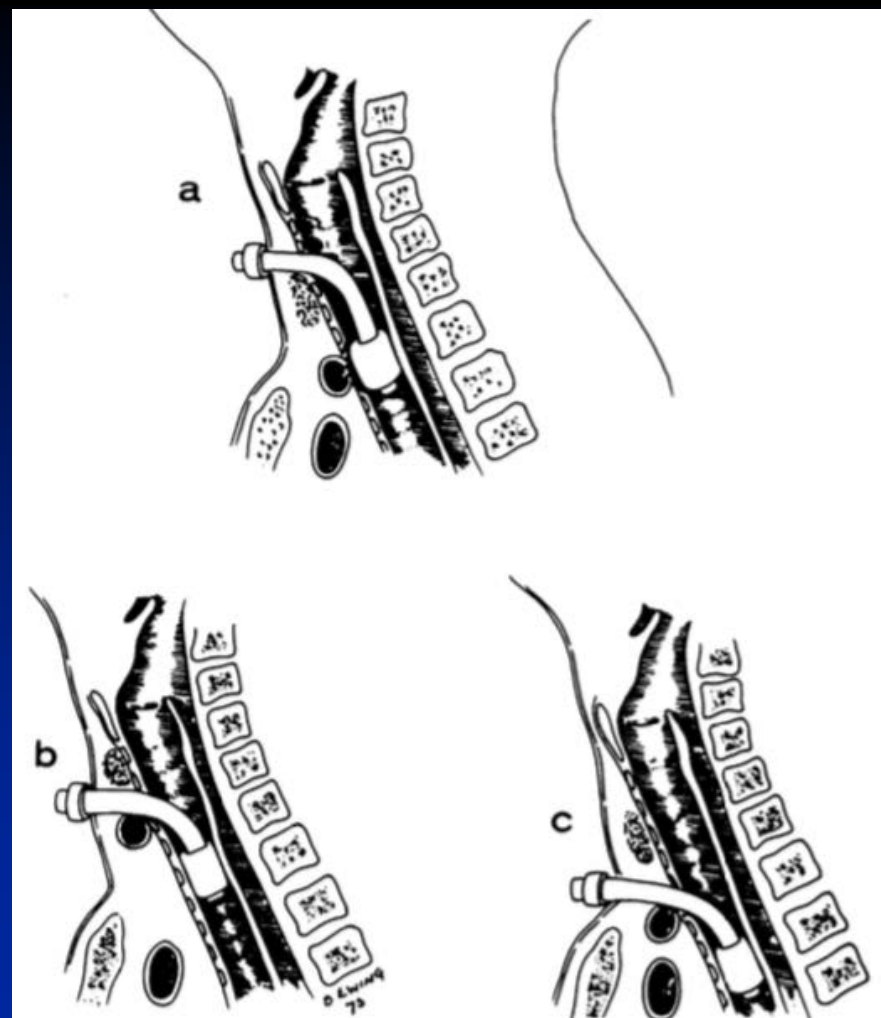
Brachiocephalic trunk

- First branch of the aorta
- Traverses trachea at 8-10th ring
- Anatomical variants exist



Contributing factors

- a. Trachea erosion into BCT
- b. Abnormally high BCT
- c. Low positioned tracheostomy



Contributing factors

Cuff overinflation

Local infection

Excessive manipulation of tracheostomy

Long term ventilation

Radiation therapy

Steroids

Diagnosis

Early diagnosis is KEY!

Warning signs

- **Sentinel bleed (small bleed in preceding hours)**
- **Pulsating tracheostomy tube**

Imaging – scope, CT angiogram, angiogram

Initial management

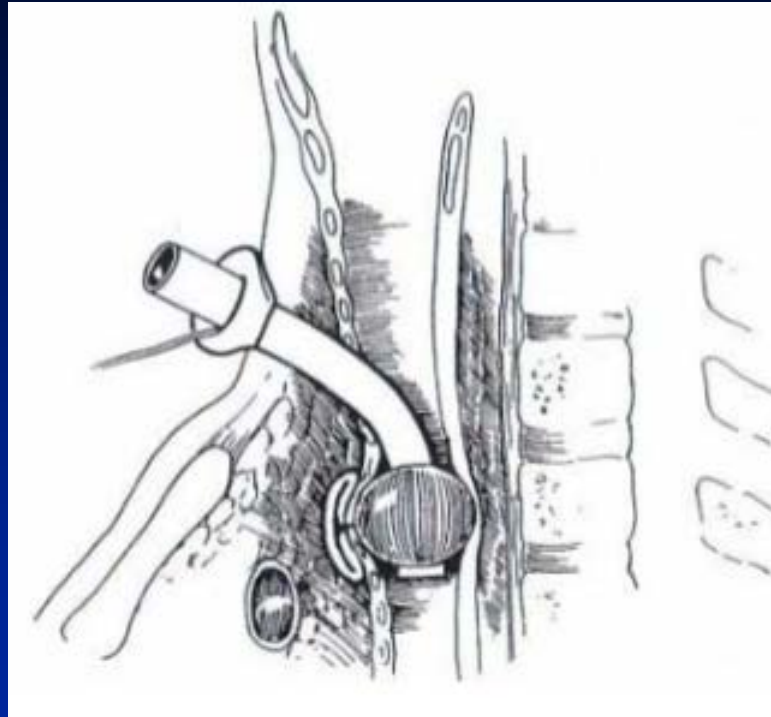
Cuff overinflation

Oral ETT distal to site

Digital compression

- Pre tracheal space
- Trachea against sternum

Take to theatre



Initial management

Cuff overinflation

Oral ETT distal to site

Digital compression

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Initial management

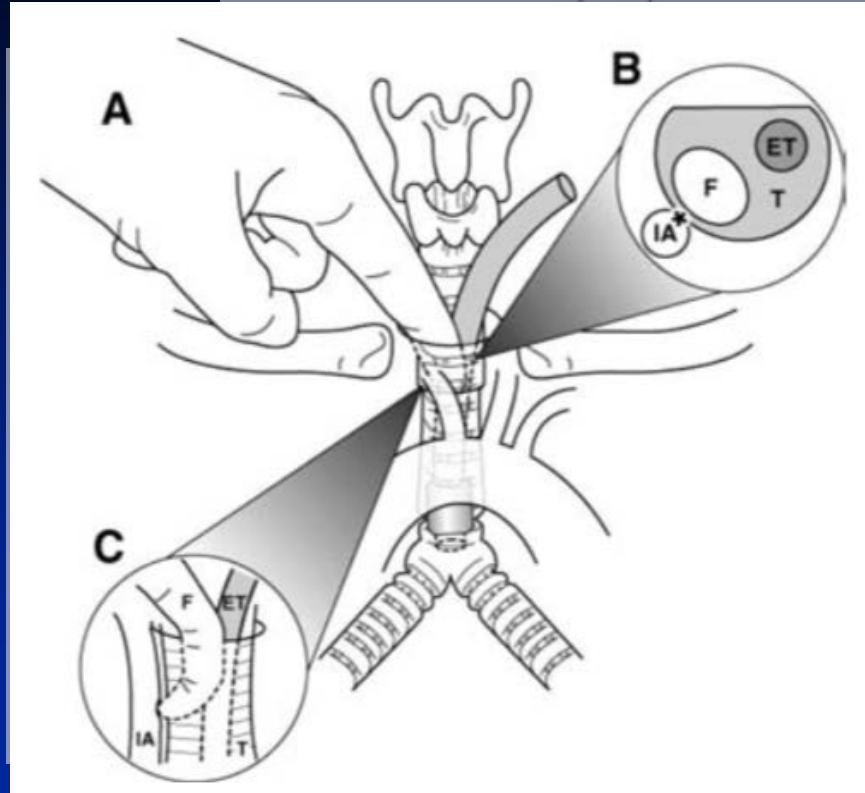
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Take to theatre



Ridley et al. The Journal of Laryngology & Otology (2006)

Jones et al. Annals of Surgery (1976)

Approach

ABCs and call for help

Clear airway – clots may need suctioning

Consider → finger pressure/cuff hyperinflation

Correct coagulopathy and replace blood products

Urgent surgical referral

Consider palliation – situation may be fatal

If it settles – investigate other causes

Issues on the ward

Respiratory distress ✓

- **Blocked/displaced tube ✓**

Bleeding

Issues on the ward

Respiratory distress ✓

- **Blocked/displaced tube ✓**

Bleeding ✓

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Decanulation

Decanulation

Decanulation

Weaning

- Direct removal
 - Routine downsizing
 - Changing to a cuffless tube
 - Capping/corking tube
- Specific to clinician and institution

Decanulation

Mechanical ventilation is no longer required

Adequate cough

Secretions are minimal – ability to clear

Upper airway obstruction is absent

Co-operative patient

Post decanulation

Tracheal stenosis – usually between stoma and cords

- **Symptomatic or asymptomatic → 3-12% require intervention**
- **Worsening dyspnoea, stridor, etc**

Tracheomalacia – weakened tracheal wall → airway collapse

- **Symptoms range from dyspnoea to failure to wean**

Post decanulation

Tracheo-oesophageal fistula

- Dyspnoea, pneumonia, recurrent aspiration, gastric distension

Tracheo-innominate fistula

Aspiration

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In the news

In the news

Doctor performs emergency tracheotomy with a PEN to save woman's life after she choked on a piece of steak in packed restaurant

By [RACHEL QUIGLEY](#)

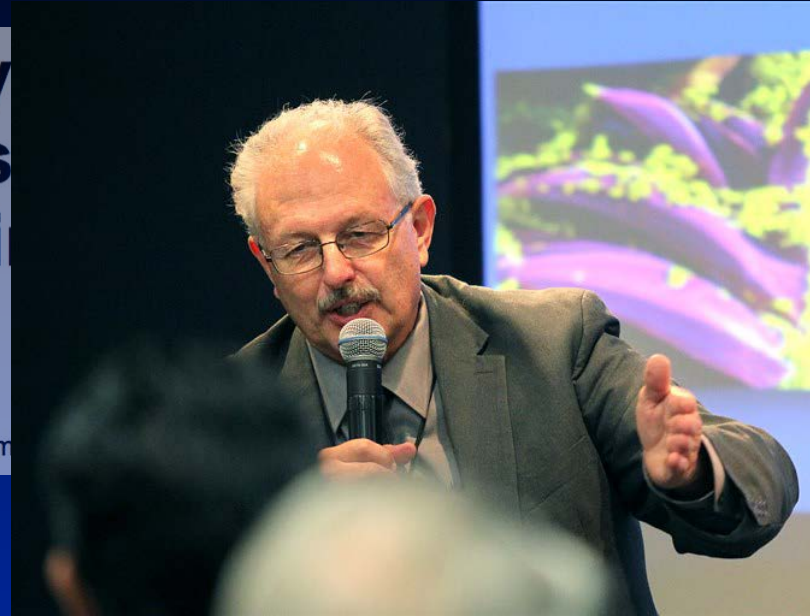
PUBLISHED: 22:43 EST, 25 September 2013 | **UPDATED:** 07:30 EST, 26 September 2013

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Dr Royce Johnson

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In the news



Pauline Larwood

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8 | UPDATED: 07:30 EST, 26 Septem



Key points

- **Tracheostomy is a subglottic airway inserted through neck directly into the trachea**
- **Two broad groups (emergency and elective) – ward patients will have elective airways**
 - **Two main techniques for each type → percutaneous and surgical**

Key points

- **Respiratory distress and bleeding - main issues on the ward**
 - **ABCs – recognise issues specific to tracheostomy tubes (occlusion, fistulas, etc) and treat if possible**
 - **It takes 7 days for a tract to form**
 - **Cuffed or uncuffed tubes**
 - **Watch out for SENTINEL BLEEDS**
- **Recognise late post tracheostomy complications**

The End



The End



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Dr Liza Phillips, Dr Yasmine Ali Abdelhamid and the team at ICU Research*

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