

Anaesthesia for Tracheal Surgery

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Overview

- Tracheal problems you might meet
- Pre-operative assessment
- Specific procedures

So let's start with a case...

- 57 year old gentleman
 - Called LAS due to breathlessness, sore throat, hoarse voice and sharp left sided chest pain
 - PMH
 - Hypertension
 - COPD
 - Depression
 - Recent admission elsewhere for LRTI
 - On LAS arrival SpO₂ 90% and BP 203/131
 - ECG ? Anterior ST elevation
 - Given aspirin/GTN/morphine and transferred to SBH as PPCI

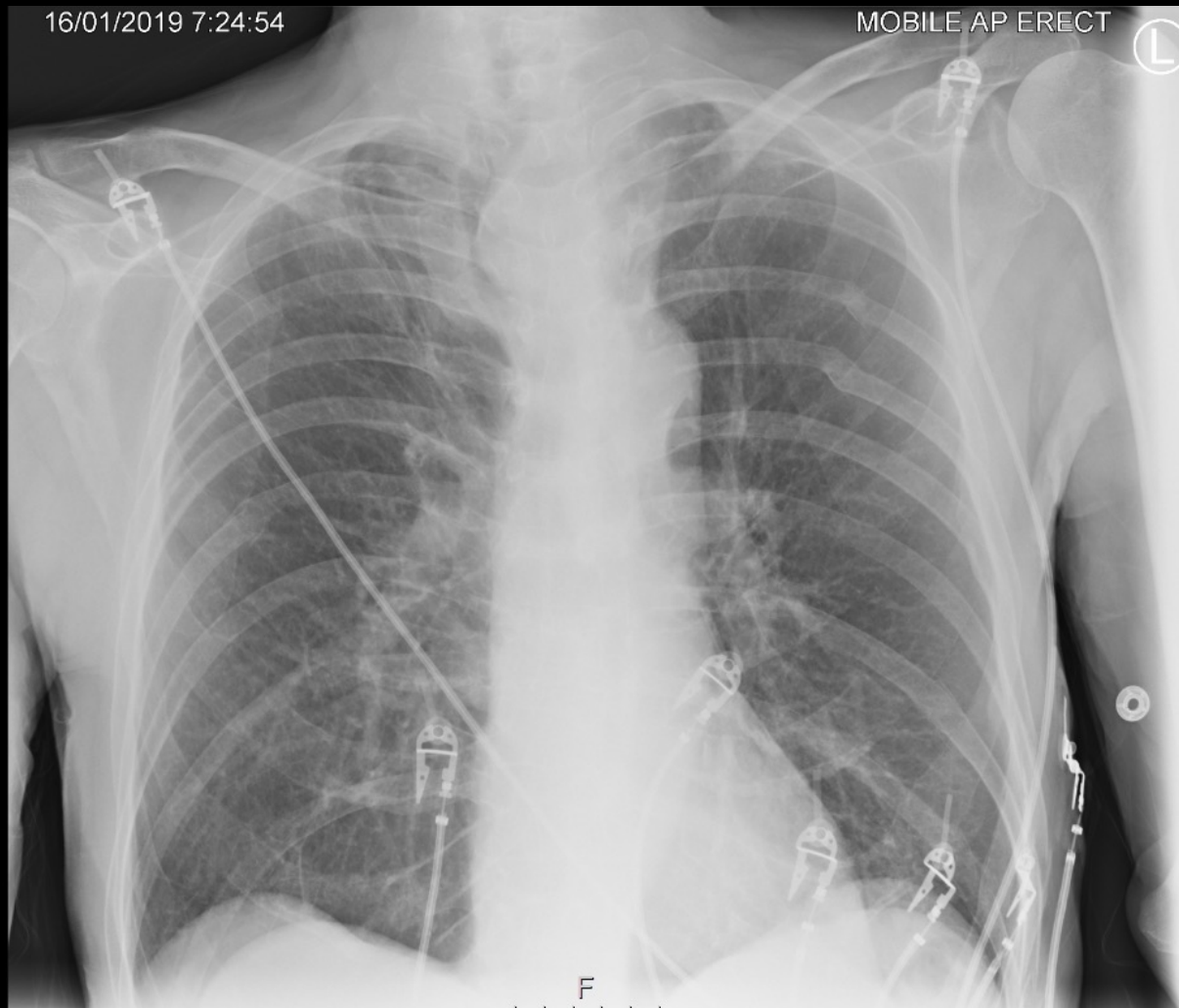


In HAC Room

- Seen by cardiology SpR and SHO
- SpO₂ 90% on air and wheezy throughout but not overtly in failure
- Noted to poorly tolerate lying flat
- ECG: STE which resolved with GTN to show deep anterior TWI
- TTE: Moderate LV dysfunction with hypokinetic anterior wall

- Imp:
 - Infective exacerbation of COPD
 - Possible anterior STEMI with spontaneous reperfusion
 - ? Lung malignancy due to hoarse voice
- Plan:
 - Medical management of MI
 - Steroids and antibiotics

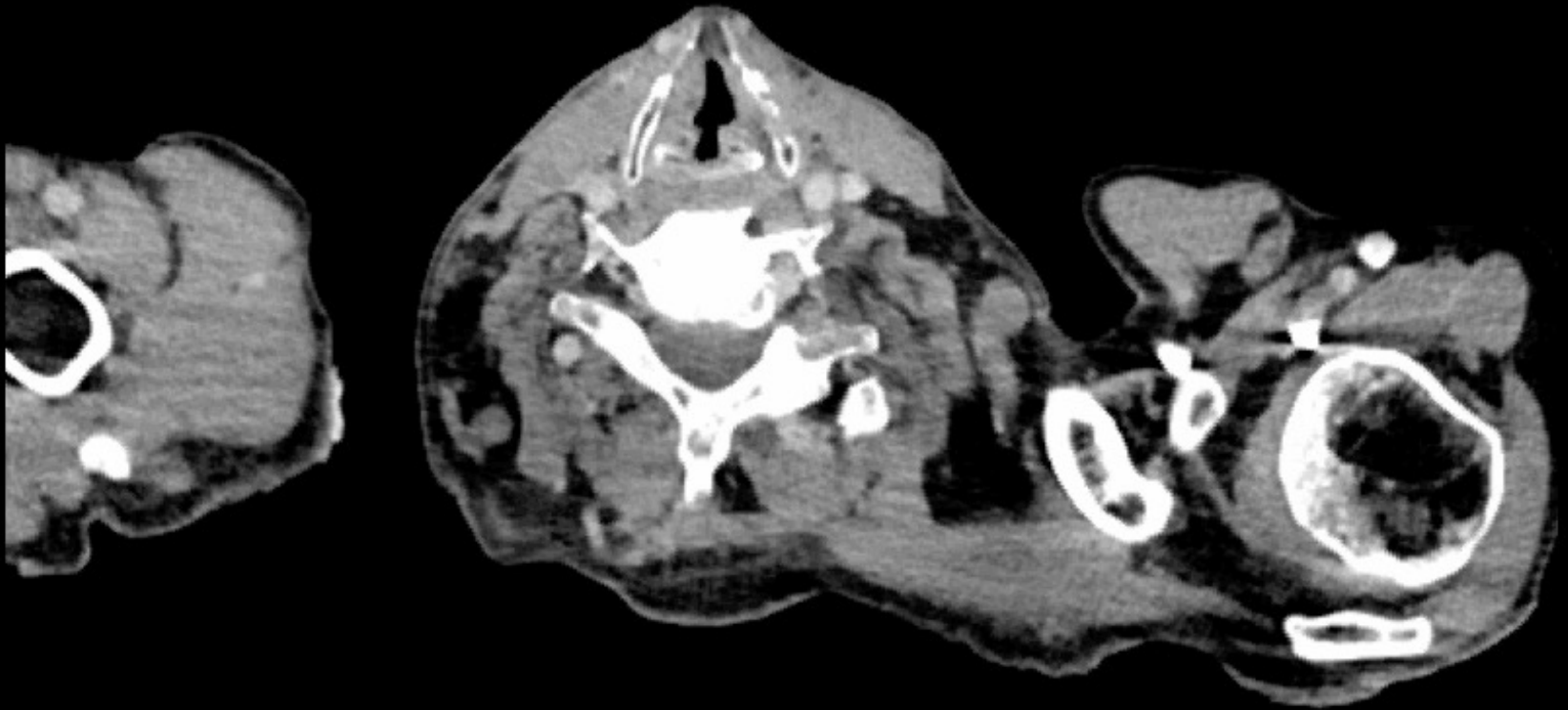
Admission CXR



Next day

- Consultant WR
 - Noted RUZ mass and ECG changes
 - Planned for angio ? Proceed
 - CT Neck and Chest
 - Respiratory Medicine referral
- Angio:
 - Proximal LAD lesion 75-90%
 - Single drug-eluting stent
 - Aspirin and ticagrelor administered

CT Neck and Chest



Post-CT

- CT:
 - Critical crescentic airway extrinsic compression at sternal notch to upper mediastinum with separate oesophageal lesion
- ENT
 - FNE: left vocal cord palsy
 - Became stridulous on passage beyond – subglottis not seen
 - Planned decompression, thyroidectomy and panendoscopy
- Thoracic and ITU Team involved...

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Aetiology

- Intrinsic lesion vs. extrinsic compression?
- Commonest causes
 - Lymphoma
 - Hodgkin's
 - Non-Hodgkin's lymphoma
 - Thymoma
 - Germ cell tumours
 - Granuloma
 - Bronchogenic carcinoma
 - Thyroid masses
 - Bronchogenic cyst
 - Cystic hygroma

Presentation

- Often non-specific
 - Dyspnoea
 - Chest pain/fullness
 - Cough
 - Hoarseness
 - Dysphagia
- Systemic features
- Local effects
 - SVC obstruction
 - Bronchial or carinal compression

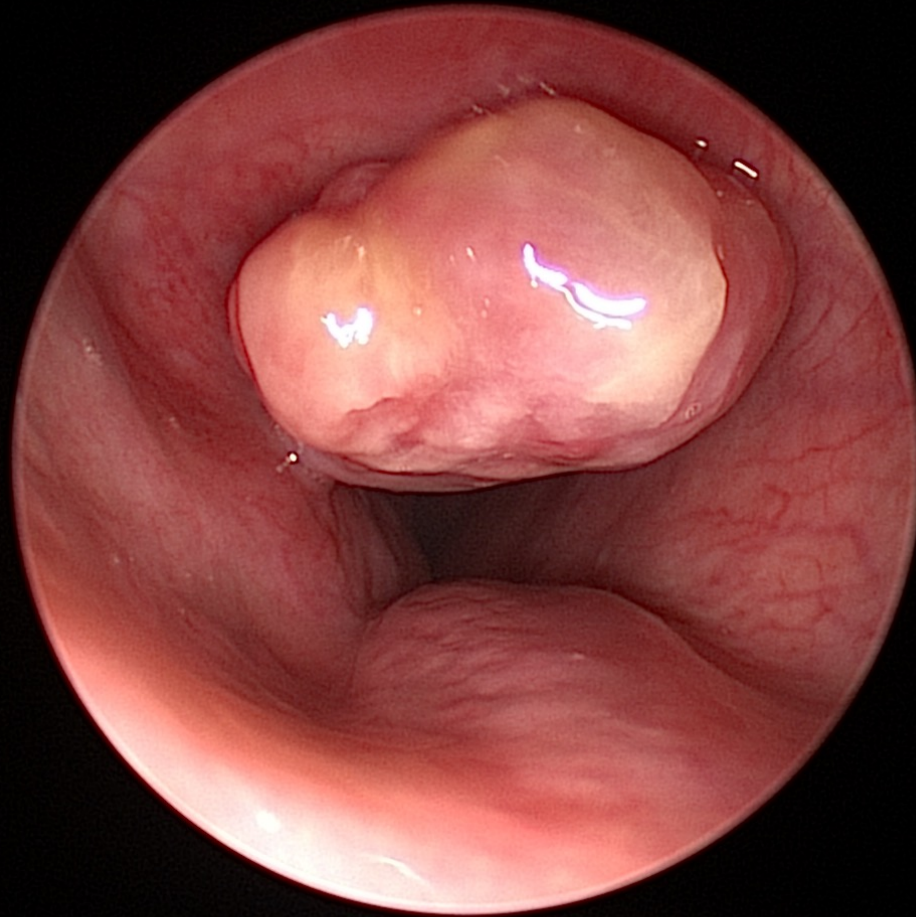
Anaesthetic considerations

- Vary according to anatomy, pathology and proposed surgery
- Possible diagnostic/therapeutic surgical procedures include:
 - Bronchoscopy
 - Sternotomy
 - Thoracotomy
 - Cervical mediastinoscopy
 - VATS resection/biopsy
 - Biopsy of extra-thoracic mass
- Occasionally present for another indication such as TAAA or LSCS
- High morbidity as may have complete airway obstruction

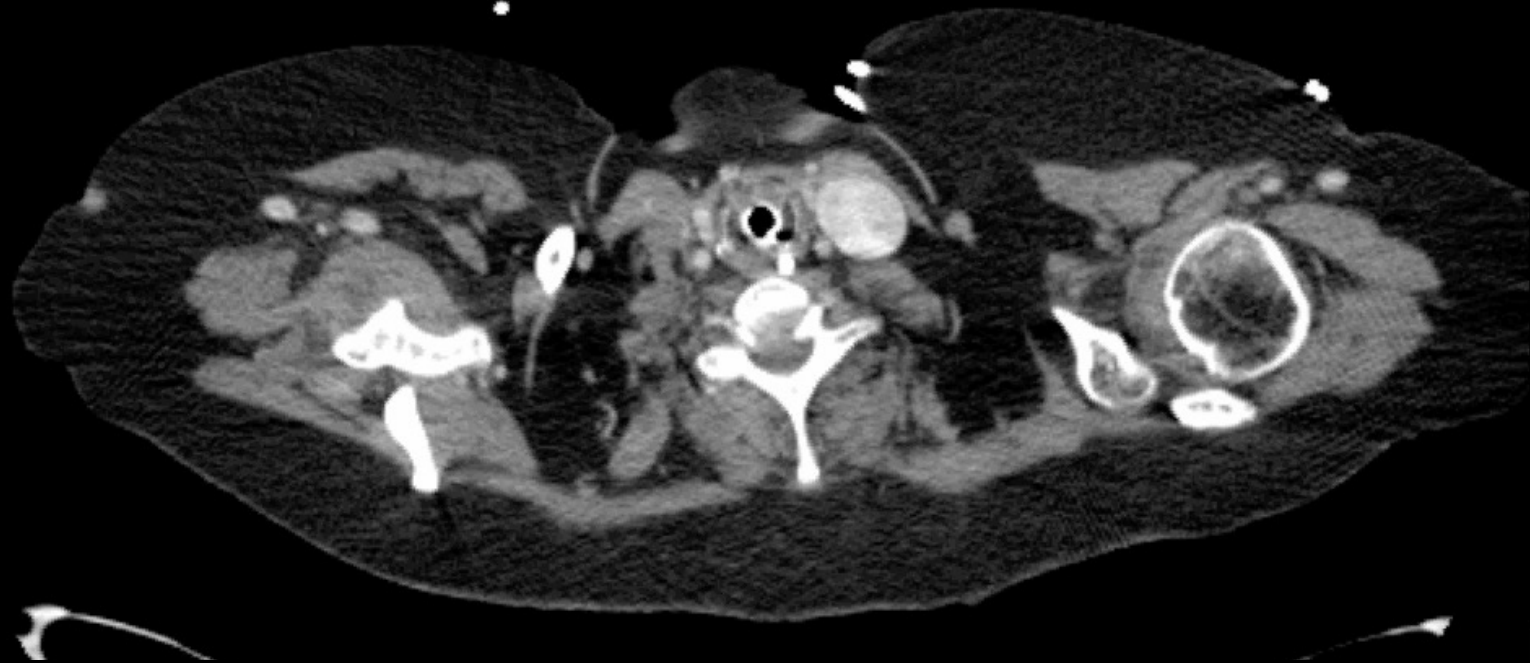
Assessment

- Usual anaesthesia chat plus
 - Standard upper airway exam
 - FNE by ENT **or yourself if safe to do so**
 - Look for systemic features and SCVO
 - Imaging
 - CXR
 - CT neck and chest
 - Flexible bronchoscopy if available

Assessment



Assessment



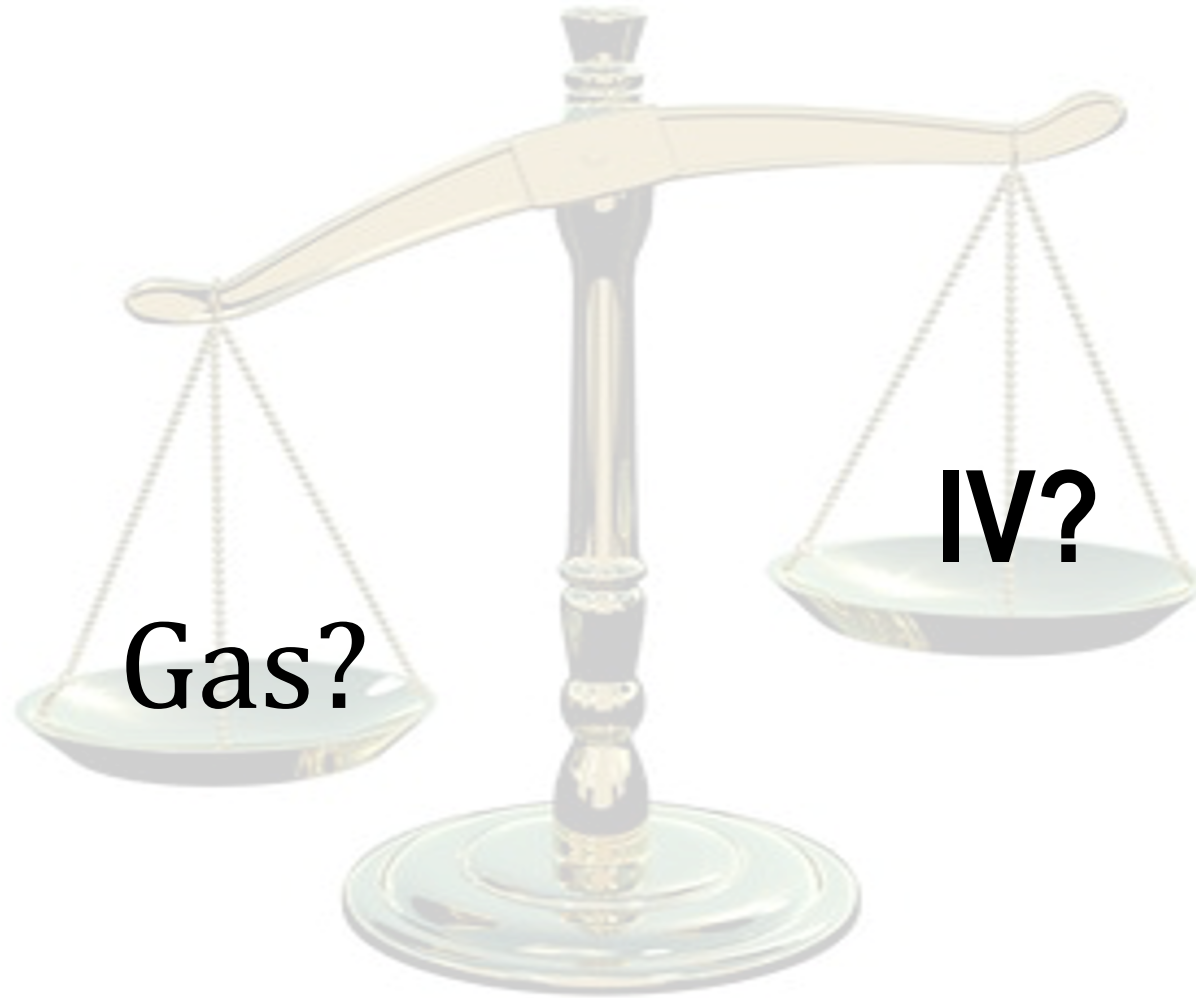
Assessment

- Specific questions
 - What **level** is the obstruction?
 - How severe is it?
 - Narrowing
 - **Length**
 - Will lung **isolation** be needed?
 - What effects are there on the **pulmonary vasculature**?
 - What are the **intrathoracic pressure** effects?
 - How will you mitigate the haemodynamic effects of IPPV?
- **What operation are you gonna do...?**

Airway Management

- Temporising measures
 - Nebulised adrenaline
 - Heliox
 - Steroids
 - (Endotracheal intubation)

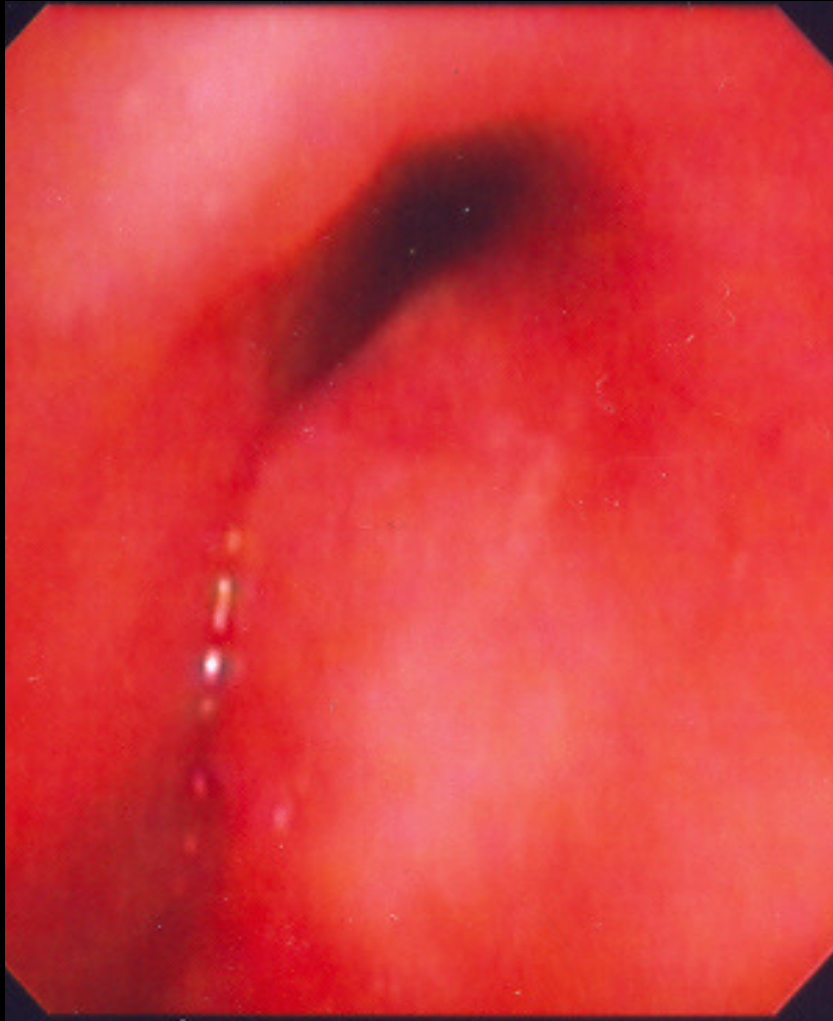
How to induce?



What about resection?

- Usually done to improve airway **patency**
 - Post-intubation stenoses
 - Post-traumatic
 - Connective tissue diseases (SLE/Wegner's)
 - Cancers
- **Resection is not an acute procedure**
 - Ballooning or stenting for compression or stenosis
 - Disobliteration for obstructing lesions
- Won't talk about what makes it resectable (Kelvin will cover this later...)

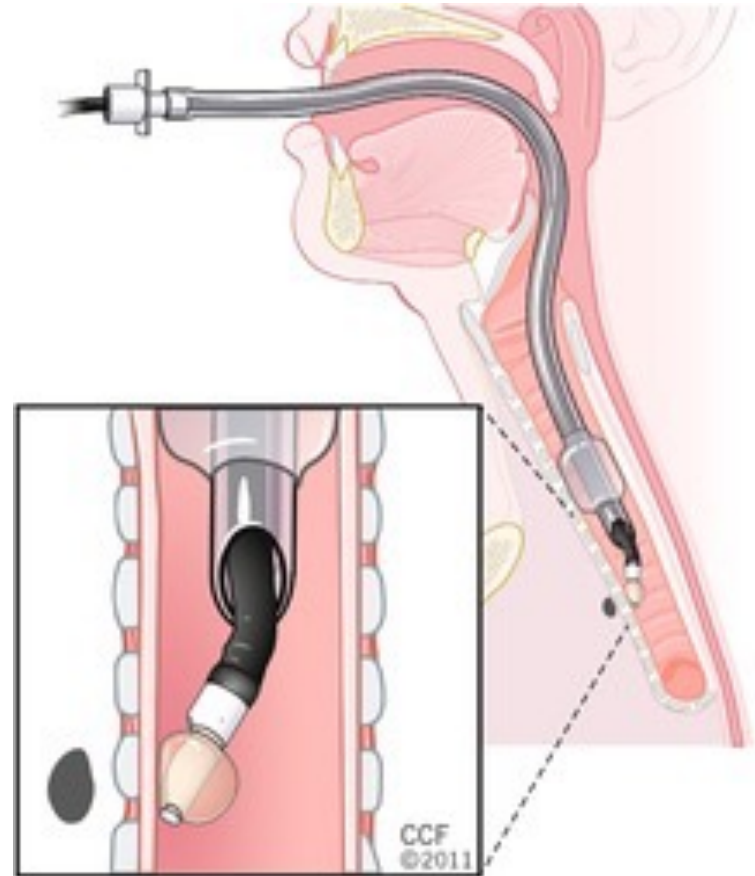
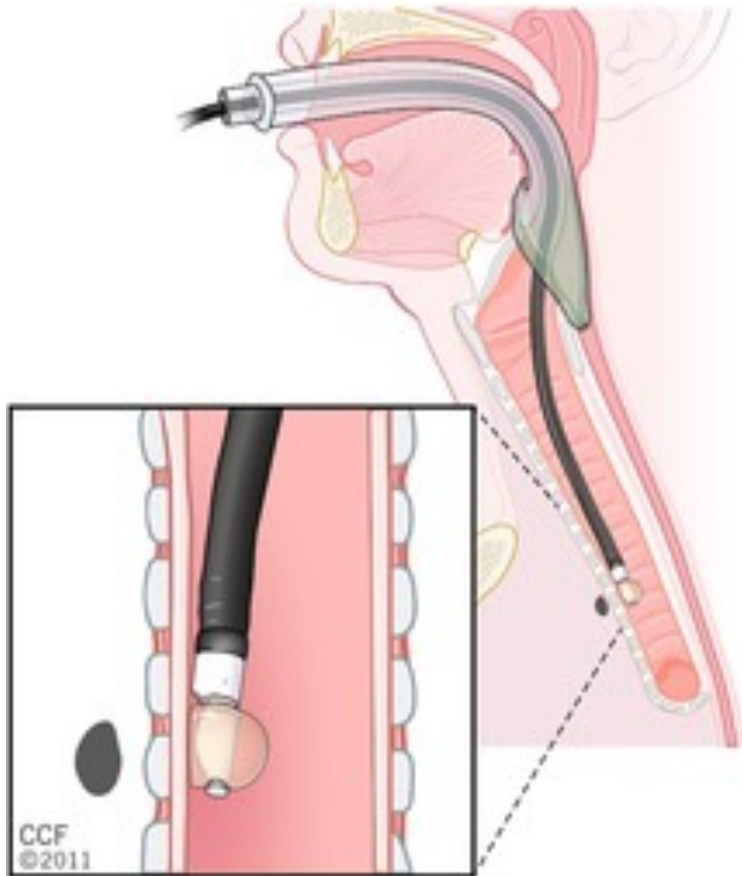
Stents



Stents

- Supine, standard monitoring
- IABP dictated by patient status rather than procedure per-se
- Conduct
 - TIVA or gas?
 - Sedation or GA?
 - Relaxant? Spray cords?
- If radiology
 - Special table
 - May not be real time fluoroscopic guidance
 - Prepare for bleeding!
 - C-arm so put things on the right hand side in general

Airway Choice



Simultaneous Ventilation



Ventilating Bronchoscope



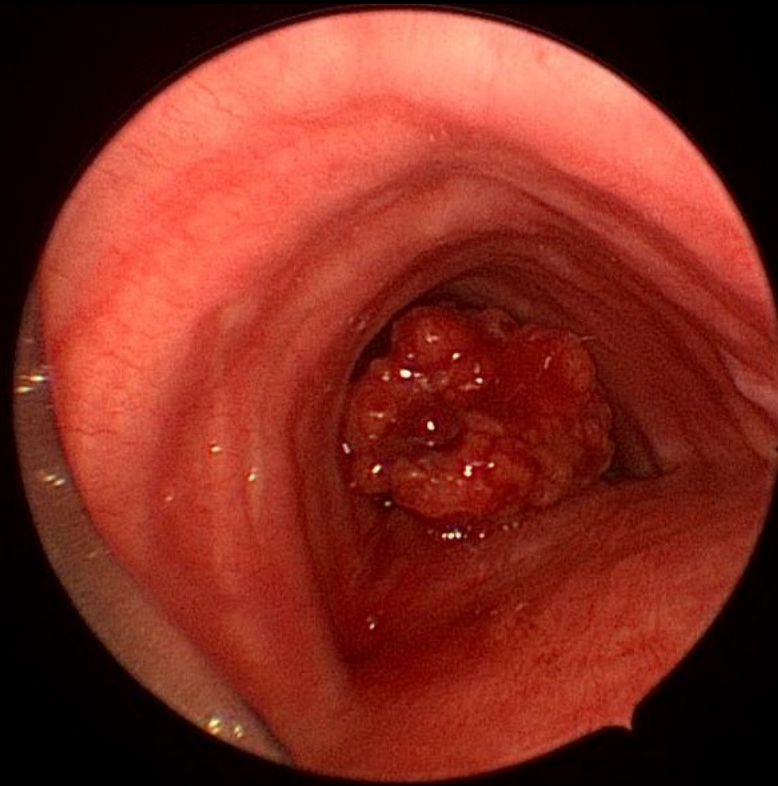
Intermittent Apnoea



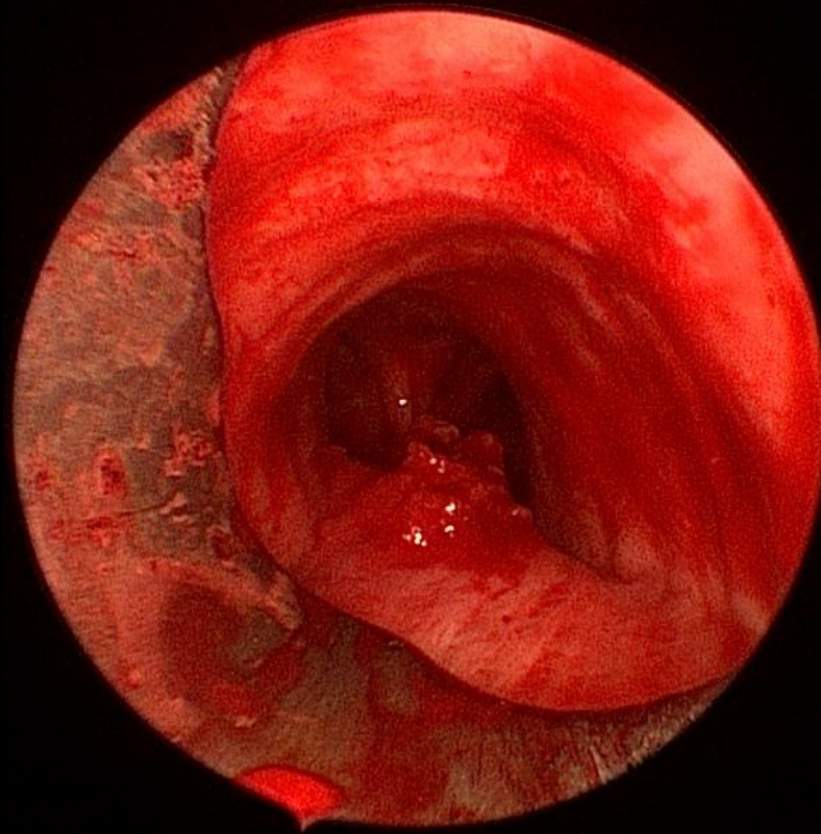
Jet Ventilation



Disobliteration



Disobliteration



What about resection?

- Indications
 - Functionally **very good**
 - Competent glottis
 - Will extubate
- Contraindications
 - Severe pulmonary disease
 - Airway infection
 - Poorly cooperative with post-op physiotherapy
 - Previous XT
 - Steroid dependence
 - Invasive tumours
 - Long or complex lesions

Which approach?

- High and mid
 - Supine with neck extended
 - Collar incision ± sternotomy
- Low tracheal
 - Left lateral with neck flexed
 - Right posterolateral thoracotomy
- Carinal
 - Usually left lateral with neck flexed
 - Usually right posterolateral thoracotomy
 - Occasionally clamshell or left posterolateral thoracotomy

Approach

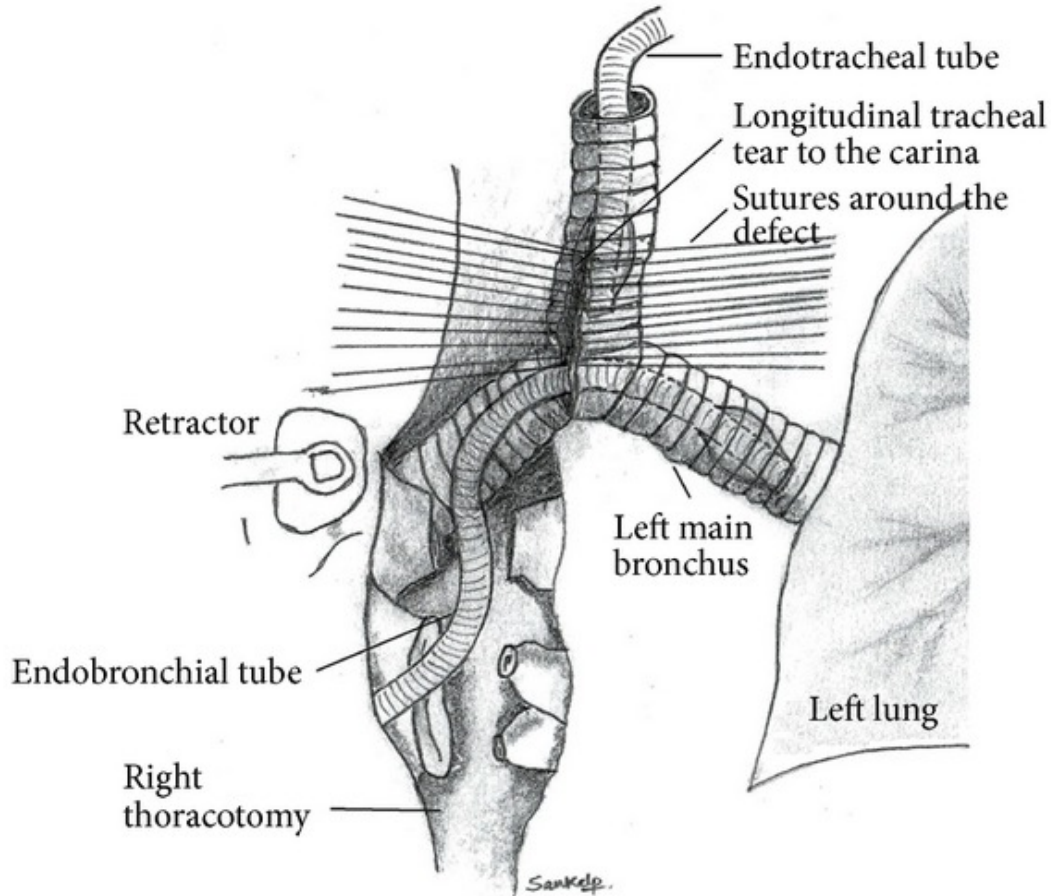
- Standard AAGBI monitoring
- Left radial arterial line
- Right internal jugular multi-lumen CVC
- Nasogastric tube and urinary catheter
- Epidural for thoracotomy

- Extra kit
 - Second anaesthesia machine or vent
 - Long, fleximetallic COETT
 - Jet ventilator and catheters
 - Fibreoptic scope
 - Sterile catheter mounts
 - Perfusionist...?

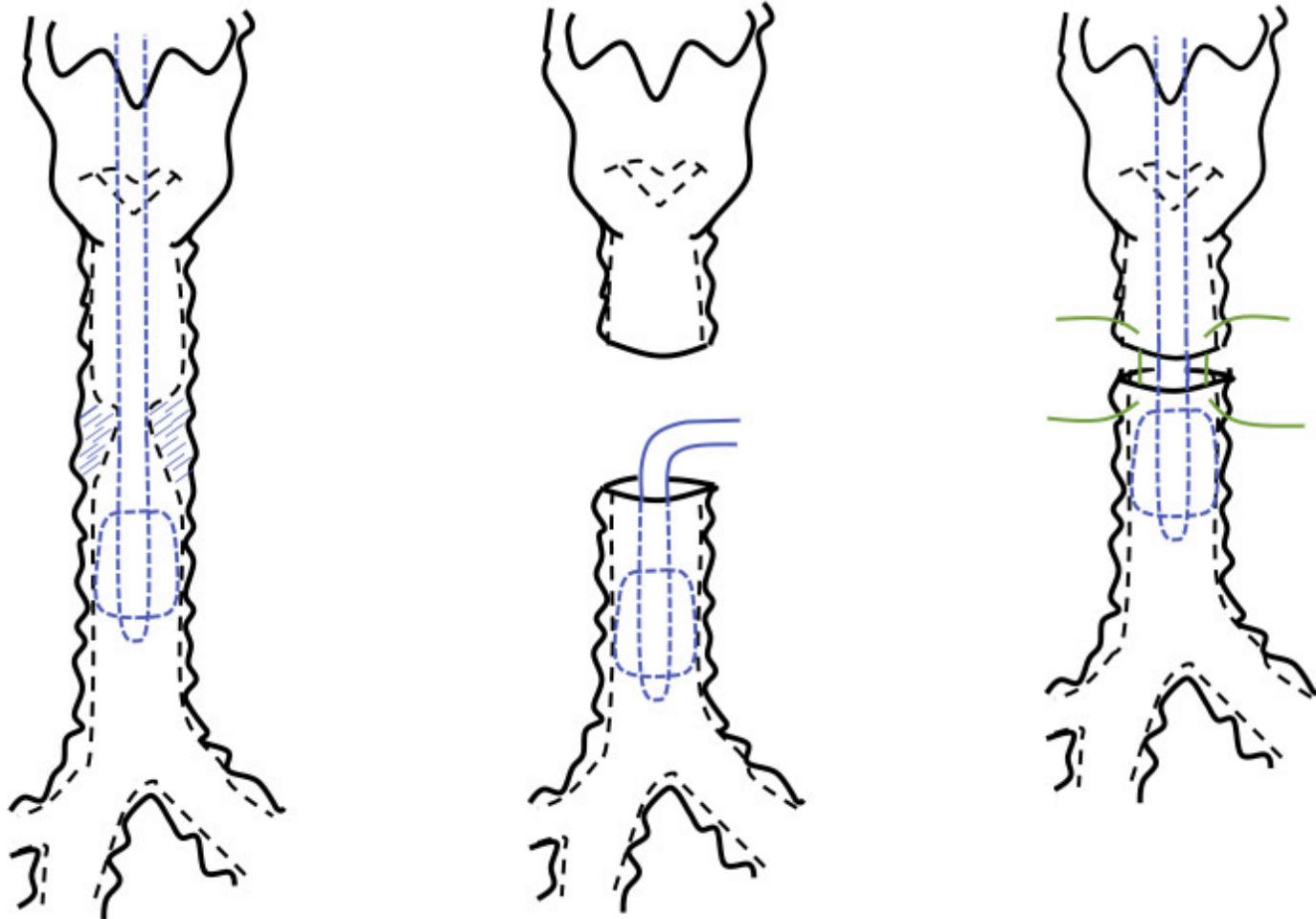
Which gadget?

- Depends on level of obstruction and intervention planned
 - Classical teaching a tube below the obstruction with IPPV or one above with spontaneous ventilation
 - **The view may not be that difficult...**
- Spont breathing with LMA til thoracotomy
 - If disobliterated - long armoured tube past obstruction to distal tracheal or left main bronchus
 - If not disobliterated - tube above lesion while this done
- Whatever you do, **you do it with the surgeon ready and the rigid bronchoscope open** and a jet ventilator ready to go!

Cross table ventilation



Cross table ventilation



Extubation

- Potentially the most crucial period of the entire process
 - Post-operative mechanical ventilation is strongly associated with anastamotic breakdown
 - Reintubation might be difficult...
 - Risk of laryngeal nerve injury
 - Need adrenaline nebulisers etc available
- To reintubate
 - Small tube
 - Scope
 - Apnoea ideally until you are below the anatamosis!



Back to our case

- Admitted to ICU
 - Clinically stable although required repeated doses adrenaline
 - Planned for surgery 48/24 after admission
 - Antiplatelet considerations
 - Equipment
 - Staffing
 - Secured arterial and venous access

Back to our case

- Day of surgery
 - Pre-oxygenated with PS via theatre vent and HFNC applied
 - Bolt upright, SpO₂ 80% on arrival to theatre when positioning
 - Fluid preloading whilst doing so
 - IV induction Fent / Prop / Roc
 - C-Mac with NIMI-3 ETT, good view with bougie used
 - Ambuscope available to ensure position relative to carina
 - **ENT and thoracic surgeons sat in theatre with rigid bronchoscope and jet ventilator available**
- Laryngeal nerve monitor required therefore suggamadex administered following loading with remifentanil
- Maintenance with O₂ / Air / Sevo 3%

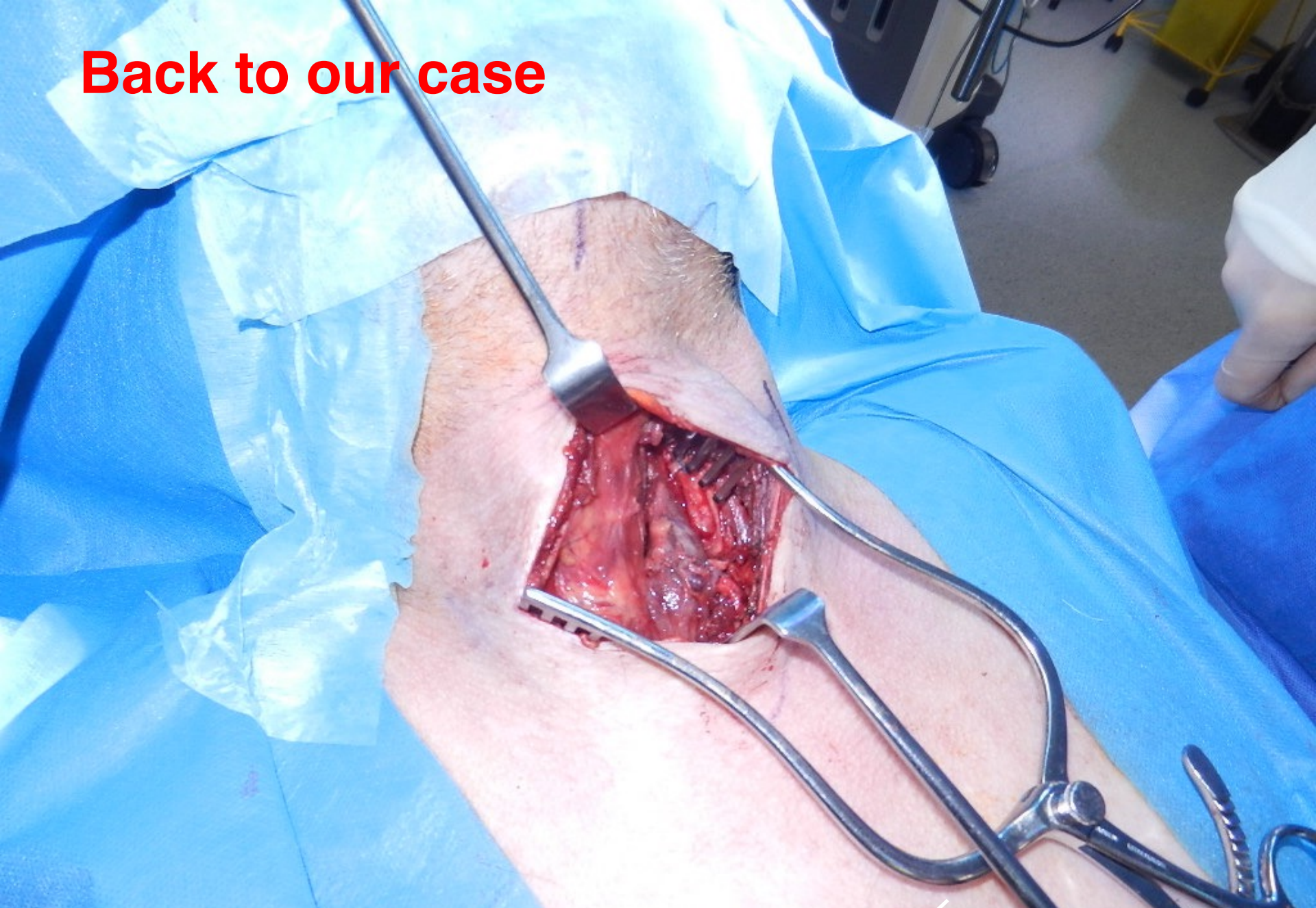
Back to our case

- Significant gas trapping
 - IPPV PRVC, FiO₂ 0.6-1.0
 - P_{peak} 35-40 cmH₂O but P_{mean} only 11-12
 - PEEP 4 cmH₂O, I:E 1:6-1:8
 - Serial disconnections and manual deflation +++
- Filled and low dose pressor started targeting MAP around 70 mmHg
- Neck incision
 - Difficult anatomy
 - Large mass extending down into mediastinum
 - Arising from posterior area of neck rather than thyroid
 - Malignant in appearance

Back to our case

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 - Difficult anatomy
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Back to our case



Back to our case

- Sternotomy

- Non-oncological debulking with **significant improvement in Ppeak**
- Total thyroidectomy from the chest
- Both pleura opened by surgeon to exclude pneumothoraces with bilateral chest drain insertion via mediastinum

Back to our case

- Returned to ICU after ETT changed
- Extubated following day
- Histology confirmed oesophageal origin
- MDT: no chemotherapeutic options available and palliated

ARE WE THERE YET?



Summary

- Central airway obstruction can present **indolently** or in extremis
- **Rigid bronchoscopy** is your rescue technique in most situations
- Think about prolonged expiration and **gas trapping**
- Think about how to **get below** the obstruction (most of the time...)
- The view might not be the problem...