LEARNING OUTCOMES

- POPULAR EXAM TOPICS
- ANATOMY OF THE AIRWAY AND ATI
- CLINICAL CASES
- SBA/MCQS
**RECENT PUBLICATIONS**

- DAS AWAKE TRACHEAL INTUBATION GUIDELINES
- PAEDIATRIC ADENOTONSILLECTOMY BJAED JUNE 20
- PERIOPERATIVE MX OF CHILD WITH TRACHEOSTOMY JAN 2020
- SUX OR ROC FOR RSI DEC 2019
- UPDATE ON MX OF TRACHEOSTOMY NOV 2019
- EMERGENCY FONA AUG 2019

**AIRWAY EMERGENCIES:**
- BLEEDING TONSIL
- INHALED FOREIGN BODY
- CROUP/EPIGLOTTITIS

**ANATOMY:**
- NOSE
- LARYNX
- TRACHEOBRONCHIAL TREE

**ENT:**
- LASER AIRWAY SURGERY
- JET VENTILATION
- AIRWAY IMAGING
- MIDDLE EAR SURGERY
- THYROIDECTOMY

**MAXFACS:**
- BIMAX OSTEOTOMY
- DENTAL DAMAGE
- INTRA-ORAL ABSCESSES
- FACIAL TRAUMA
- HEAD AND NECK CANCERS

**EQUIPMENT:**
- SAD
- ETT
- TRACHEOSTOMY
- BRONCHOSCOPES
- FIBREOPTIC SCOPES
- HFNOT
## Indications and Contraindications for ATI

<table>
<thead>
<tr>
<th>Indications</th>
<th>Contraindications</th>
</tr>
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<tbody>
<tr>
<td>Known/ anticipated difficult ‘airway’: (FMV/SAD/Intubation/FONA)</td>
<td>Patient refusal/lack of co-operation</td>
</tr>
<tr>
<td>Head and neck pathology (malignancy, previous surgery, radiotherapy)</td>
<td>LA allergy</td>
</tr>
<tr>
<td>Reduced MO</td>
<td>Upper airway bleeding</td>
</tr>
<tr>
<td>Limited neck extension</td>
<td>Narrowed airway - obstruction with scope (ATI:VL benefits over ATI:FB)</td>
</tr>
<tr>
<td>OSA</td>
<td>Nasal intubation: basal skull #</td>
</tr>
<tr>
<td>Morbid obesity</td>
<td>Lack of experienced operator</td>
</tr>
</tbody>
</table>
ANATOMY QUIZ

① IDENTIFY ANATOMICAL STRUCTURES

② NERVE SUPPLY TO EACH AREA?

③ HOW WOULD YOU ANAESTHETISE EACH AREA FOR AN ATI:FB VIA NASAL ROUTE?
V:
NASOCILIARY BRANCH OF OPHTHALMIC NERVE (V1)
NASOPALATINE BRANCH OF MAXILLARY NERVE (V2)

IX:
BASE OF TONGUE, VALLECUA, EPIGLOTTIS

X:
SLN (BRANCH OF ILN): INFERIOR EPIGLOTTIS AND ABOVE CORDS
RLN: BELOW CORDS
TOPICALIZATION FOR ATI

1) SAFE DOSE OF LA FOR TOPICALIZATION? 9MG/KG

Co-phenylcaine = 2.5ml 5% lidocaine, 0.5% phenylephrine

125mg lidocaine

Xylocaine (Lidocaine) Spray 10%

Each actuation/spray 0.1ml = 10mg lidocaine

9MG/KGX 75 = 675MG

- 125MG BLUE SPRAY
- 200MG 20 SPRAYS XYLOCAINE
- 80MG (4X20MG) SAYG
= 405MG
‘sTOP’

TUBE TYPE: REINFORCED, FLEXIBLE NASAL, FASTRACH (COME WITH ILMA)
Checklist for Awake Tracheal Intubation

1. Location

2. Appropriate staff present
   - Anaesthetic assistant
   - Second anaesthetist
   - Other

3. Team briefed
   - Procedure outline
   - Role allocation
   - Plan for failure

4. ATI device selected, prepared and checked
   - Tube type

<table>
<thead>
<tr>
<th>Flexible bronchoscope</th>
<th>Videolaryngoscope</th>
</tr>
</thead>
</table>
| Route
| Optional adjuncts
| Oral airway | Suction
| SAD | Mucosal atomiser
| Airway catheter | Epidural catheter
| Device/blade
| Optional adjuncts
| Stylist
| Suction
| Impleg
| Mucosal atomiser
| Device check
| Focus | Tube correctly loaded
| White balance | Image orientation
| Lubricated
| Anti-fog/wipe
| Battery/power
| Device check
| Lubricated
| Anti-fog/wipe
| Tube correctly loaded
| Battery/power

5. Oxygenation

6. Sedation (if required)

7. Topicalisation
   - Maximal topical dose:
     - Vag: ___ mg
     - Larynx: ___ mg
     - Trachea: ___ mg

8. Setup position
   - Operator
   - Patient
   - Monitor
   - Suction
   - Pumps
   - Step
   - Airway trolley
   - Bed
A 75 year old man presents for laser laryngeal surgery due to a suspicious lesion on his left vocal cord.

• What does LASER stand for? (2 marks)

• What kind of laser is commonly used for laryngeal surgery? (1 mark)

• Indications for laser laryngeal surgery? (2 marks)

• What are the specific risks of laser airway surgery? (4 marks)

• What perioperative precautions would you take to minimise these risks? (6 marks)

• In the case of an airway fire, what would you do? (5 marks)
LASER

= LIGHT AMPLIFICATION BY STIMULATED EMISSION OF RADIATION =

• AIRWAY: COMMONLY CARBON DIOXIDE LASER 10600 NANOMETRES

• NODULES, PAPILLOMATOSIS, LEUKOPLAKIA, SCC GLOTTIS, GLOTTIC/SUBGLOTTIC STENOSIS
RISKS OF LASER

1. EYE DAMAGE
2. SKIN AND DRAPE DAMAGE
3. AIRWAY FIRE
4. LASER PLUME RESPIRATORY IRRITANT
PRECAUTIONS

- Shared Airway
- ETT vs Jet Ventilation. Laser tubes are fire resistant not fire proof
- Double cuff, cuff filled with saline and methylene blue
- FiO₂ to a minimum during laser activation
- Laser signs, doors locked, windows covered
- Eye protection – patient and staff
- Exposed areas covered in saline soaked gauze
- Mention use of laser in WHO checklist
- Laser Safety Officer
‘THE FIRST PATIENT ON MY ROUTINE ENT LIST, WAS SCHEDULED FOR A MICROLARYNGOSCOPY AND LASER OF A LARGE SUBGLOTTIC TUMOUR. WITH THE PATIENT ASLEEP AND ALL DOORS LOCKED WE PUT ON OUR SAFETY GOGGLES.

“LASER ON” SAID THE SURGEON

“LASER ON” REPEATED THE OPERATOR.

THE LASER BEAM FIRED. THE NEXT FEW SECONDS FELT LIKE A SCENE FROM A FILM, WHERE EVERYTHING HAPPENS IN SLOW MOTION BUT IN REALITY, IT IS JUST A FEW SECONDS. I WATCHED AS FEROCIOUS FLAMES EMERGED FROM THE PATIENT’S AIRWAY NEARLY TOUCHING THE MICROSCOPE. IN MY MIND I WAS ASKING ‘IS THIS FOR REAL’? THINKING ‘THIS CAN NOT BE HAPPENING’. I SWITCHED OFF THE OXYGEN, THE SURGEON REMOVED EVERYTHING FROM THE PATIENT’S AIRWAY INCLUDING THE GUM GUARD WHICH WAS ON FIRE. WE POURED LITRES OF SALINE INTO THE PATIENT’S MOUTH, IT TOOK THREE ATTEMPTS TO PUT THE FIRE OUT.’
AIRWAY FIRE DRILL

- ETT OUT (REMOVE FLAMMABLE MATERIAL=FUEL)
- ANAESTHETIC GASES OFF (REMOVE OXYGEN)
- EXTINGUISH FIRE-POUR SALINE INTO AIRWAY+++
- MAINTAIN ANAESTHESIA
- CO2 FIRE EXTINGUISHER (DRAPES ARE WATER RESISTANT…..)
- RE-SECURE AIRWAY
- EVALUATE AIRWAY (BRONCHOSCOPY)
- POST OP DESTINATION
A 54 year old patient with base of tongue cancer presents for a hemiglossectomy, neck dissection and radial forearm free flap reconstruction with tracheostomy formation.

A) What are the benefits of free flap reconstruction? (2 marks)

B) Which other conditions require free flap reconstruction? (2 marks)

C) Which specific factors must the anaesthetist consider when assessing this patient prior to surgery? (4 marks)

D) What are the intra-operative considerations? (6 marks)

E) What are the causes of flap failure? (6 marks)
**FREE FLAP SURGERY**

**Conditions requiring free flap**

<table>
<thead>
<tr>
<th>Condition</th>
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<tbody>
<tr>
<td>Reconstructive surgery head and neck cancers</td>
</tr>
<tr>
<td>Breast reconstructive surgery</td>
</tr>
<tr>
<td>Reconstructive hand surgery</td>
</tr>
<tr>
<td>Burns</td>
</tr>
<tr>
<td>Trauma</td>
</tr>
</tbody>
</table>

- Free flap
- Pedicled flap
- Random pattern flap
- Tissue expansion
- Full thickness graft
- Split thickness graft
- Delayed closure
- Primary closure
- Dressings
DONOR SITES

INTRA-ORAL DEFECTS
- RADIAL FOREARM
- ANTEROLATERAL THIGH

MANDIBULAR RECONSTRUCTION
- FIBULA
- ILIAC CREST (DCIA)
- SCAPULA
**PERI-OPERATIVE CARE**

**PRE-OP**
- SMOKING
- ALCOHOL
- NUTRITION
- AIRWAY-PREVIOUS SURGERY/RADIOThERAPY, SITE OF LESION

**INTRA-OP**
- TRACHEOSTOMY FORMATION
- SIDE OF FLAP AND SURGERY (VENOUS/ARTERIAL/?CENTRAL ACCESS)
- DURATION
- POSITIONING
- TEMPERATURE (CORE AND PERIPHERAL)
- DVT PROPHYLAXIS
- NGT/PEG
- POST OP HDU
BENEFITS OF FREE FLAP

① INTEGRITY
② FUNCTION
③ AESTHETICS

• BENEFITS OF TAKING TISSUE FROM A DISTANT SITE
• BETTER OUTCOMES IF FUTURE RADIOTHERAPY NEEDED
• MINIMAL DONOR SITE MORBIDITY
CAUSES OF FLAP FAILURE

- PRIMARY ISCHAEMIA
- REPERFUSION INJURY
- SECONDARY ISCHAEMIA
FREE FLAP PHYSIOLOGY

• INTACT ARTERIAL AND VENOUS SYSTEM
• DENERVATED
• NO LYMPHATIC DRAINAGE

PHYSIOLOGICAL PRINCIPLES
• HAGEN-POISEUILLE

\[
\text{flow (Q)} = \frac{\pi \Delta P r^4}{8n \eta l}
\]

\(\Delta P = \text{Pressure difference across tube}\)
\(\eta = \text{Viscosity of liquid}\)
\(l = \text{length of tube}\)
CAUSES OF FLAP FAILURE

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Factors decreasing blood flow in free flaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial</td>
<td>Arterial thrombosis</td>
</tr>
<tr>
<td></td>
<td>Arterial spasm</td>
</tr>
<tr>
<td>Venous outflow</td>
<td>Venous thrombosis</td>
</tr>
<tr>
<td></td>
<td>Venous spasm</td>
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<tr>
<td></td>
<td>Mechanical compression (e.g. dressings)</td>
</tr>
<tr>
<td>Flap oedema</td>
<td>Excessive use of crystalloids</td>
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<tr>
<td></td>
<td>Extreme haemodilution</td>
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<tr>
<td></td>
<td>Prolonged ischaemia</td>
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<tr>
<td></td>
<td>Histamine release (e.g. anaesthetics, antibiotics)</td>
</tr>
<tr>
<td></td>
<td>Excessive tissue handling</td>
</tr>
<tr>
<td>Generalised vasoconstriction</td>
<td>Hypovolaemia</td>
</tr>
<tr>
<td></td>
<td>Hypothermia</td>
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<tr>
<td></td>
<td>Pain</td>
</tr>
<tr>
<td></td>
<td>Respiratory alkalosis</td>
</tr>
<tr>
<td>Hypotension</td>
<td>Hypovolaemia</td>
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<tr>
<td></td>
<td>Cardiac depressant drugs (e.g. anaesthetics, calcium channel blockers)</td>
</tr>
<tr>
<td></td>
<td>Extensive sympathetic blockade (e.g. epidural)</td>
</tr>
<tr>
<td></td>
<td>Profound vasodilatation</td>
</tr>
<tr>
<td></td>
<td>Cardiac failure (e.g. ischaemia, fluid overload)</td>
</tr>
<tr>
<td>Prolonged flap ischaemia</td>
<td></td>
</tr>
</tbody>
</table>

1. NORMOTENSIVE
2. OPTIMISE FLUID BALANCE
3. HAEMATOCRIT 30%
4. WARM (CORE/PERIPERAL <1 DEGREE)
5. ANALGESIA
6. AVOID RESPIRATORY ALKALOSIS
ARTERIAL OCCLUSION

- FLAT
- PALE
- COOL
- DECREASED OR ABSENT CRT
- NO BLEEDING ON PINPRICK
- LOSS OF ARTERIAL DOPPLER SIGNAL
VENOUS OCCLUSION

- OEDEMATOUS
- CONGESTED (PINK-PURPLE)
- CRT BRISK
- DARK BLEEDING ON PINPRICK
- LOSS OF VENOUS DOPPLER SIGNAL
MCQ/SBA
YOU ARE CALLED TO SEE A PATIENT WITH A TRACHEOSTOMY. HIS SATURATION DROPPED FROM 98% TO 86% ON 50% OXYGEN.

WHAT WILL BE YOUR NEXT IMMEDIATE STEP?

a. CALL FOR HELP
b. CONNECT THE TRACHEOSTOMY TUBE TO A CIRCUIT AND DO MANUAL BAGGING
   c. GIVE 100% OXYGEN
   d. PASS SUCTION CATHETER THROUGH TRACHEOSTOMY TUBE
e. REMOVE TRACHEOSTOMY TUBE
70 YEAR OLD MALE UNDERGOES RADICAL NECK DISSECTION FOR MALIGNANCY. THE PATIENT BECOMES UNSTABLE WHEN TUMOUR IS BEING DISSECTED FROM CAROTID SHEATH. SBP DROPS TO 60MMHG, HR 110, SPO$_2$ 87% AND ETCO$_2$ 1.9KPA.

THE MOST LIKELY CAUSE IS:

A. ANAPHYLAXIS  
B. CAROTID SINUS MANIPULATION  
C. MYOCARDIAL ISCHAEMIA  
D. TENSION PNEUMOTHORAX  
E. VENOUS AIR EMBOLISM
FOLLOWING A DIFFICULT INTUBATION BUT EASY BAG AND MASK VENTILATION IN AN OBESE LADY YOU CANNOT HAND VENTILATE.

WHAT WILL YOU DO FIRST?

a. TAKE OUT ETT
b. LOOK AT CAPNOGRAPH TRACE
c. LOOK AT OXYGEN SATURATION
d. GIVE NEBULISER
e. GIVE MUSCLE RELAXANT
YOU ARE CALLED TO SEE A PATIENT IN RECOVERY ONE HOUR FOLLOWING A THYROIDECTOMY OPERATION. HE HAS DIFFICULTY BREATHING AND HIS $O_2$ SATURATION HAS DROPPED TO 89% FROM 97% DESPITE A $FIO_2$ OF 60%. THE FRONT OF HIS NECK APPEARS SWOLLEN DESPITE NO BLOOD IN THE SUCTION DRAIN.

WHAT WILL BE YOUR NEXT LINE OF ACTION?

a. GET THE SURGEONS TO RE-EXPLORE THE WOUND
b. OPEN THE CLIPS IN THE FRONT OF THE NECK
   (Selected Answer)
c. GIVE CPAP USING NIV
d. NEBULISED ADRENALINE
e. URGENT USS
A man is referred by his general practitioner to the ear nose and throat (ENT) ward with a three month history of hoarseness. There is now stridor and dyspnoea but no hypoxia. Nasendoscopy shows a glottic mass with significant narrowing of the airway.

Appropriate statements regarding his management include:

A) Given the stridor, he is likely to be taken to theatre to have his airway secured.
B) Epinephrine 10 mg should be nebulised to alleviate his symptoms.
C) Awake fibreoptic intubation is likely to be performed.
D) Given the absence of hypoxia, high flow nasal oxygen is unlikely to be administered.
E) A computerised tomographic (CT) scan should be arranged

FFFFT
A 42-YEAR-OLD OBESE MAN ATTENDS HOSPITAL WITH A LARGE RETROSTERNAL GOITRE AND SIGNIFICANT TRACHEAL COMPRESSION. HE IS SHORT OF BREATH ON EXERTION AND HAS OBSTRUCTIVE SLEEP APNOEA. HIS IS ON YOUR LIST FOR TOTAL THYROIDECTOMY.

APPROPRIATE STATEMENTS REGARDING HIS MANAGEMENT INCLUDE:

A) TO OPTIMISE HIS AIRWAY BEFORE SURGERY, HIGH DOSE STEROIDS ARE LIKELY TO BE PRESCRIBED
B) TRACHEOSTOMY IS LIKELY TO BE PART OF HIS AIRWAY STRATEGY
C) PATIENTS WITH HEAD AND NECK DISEASE ARE UNDER-REPRESENTED IN THE ASSESSMENT OF ADVERSE OUTCOMES IN THE NATIONAL AUDIT PROJECT 4
D) THE LACK OF AIRWAY SYMPTOMS SUCH AS STRIDOR IS LIKELY TO BE REASSURING
E) FIBREOPTIC INTUBATION AFTER INDUCTION OF GENERAL ANAESTHESIA IS LIKELY TO BE INDICATED
A 56 YEAR-OLD LADY PRESENTS TO THE EMERGENCY DEPARTMENT IN A DISTRICT GENERAL HOSPITAL WITH PRESUMED ANGIO-OEDEMA AFTER TAKING LISINOPRIL. SHE HAS DEVELOPED MASSIVE TONGUE SWELLING, AS WELL AS A WEAK VOICE AND COUGH. SHE SEEMS TO BE HYPOXIC ON ROOM AIR.

APPROPRIATE STATEMENTS REGARDING THIS SITUATION INCLUDE:

A) SHE HAS SIGNS OF LARYNGEAL OEDEMA

B) SHE IS LIKELY TO BE TRANSFERRED BY AMBULANCE TO THE EAR, NOSE AND THROAT WARD FOR A FORMAL ASSESSMENT

C) AWAKE STANDARD FIBREOPTIC INTUBATION OF THE TRACHEA IS MORE LIKELY TO BE SUCCESSFUL THAN INTUBATION BY AWAKE VIDEOLARYNGOSCOPY

D) SURGEONS ARE LIKELY TO BE STANDING READY TO CARRY OUT SURGICAL CRICOTHYROIDOTOMY DURING ATTEMPTS TO SECURE THE AIRWAY

E) AFTER FAILURE OF TRACHEAL INTUBATION UNDER GENERAL ANAESTHESIA THAT INCLUDES ROCURONIUM, THE NEXT STEP IS LIKELY TO BE REVERSAL OF MUSCLE RELAXATION FOR RETURN OF SPONTANEOUS VENTILATION

TFTTF
AWAKE VIDEOLARYNGOSCOPY:

A) IS LIKELY TO BE USEFUL IN THE PRESENCE OF EPIGLOTTIC CYSTS
B) IS WELL TOLERATED WHEN HYPER-ANGULATED DEVICES ARE USE
C) IS LIKELY TO BE FOLLOWED BY USE OF A TRACHEAL TUBE CONTAINING A STYLET
D) IS A SKILL THAT IS MORE DIFFICULT TO ACQUIRE THAN STANDARD FIBREOPTIC LARYNGOSCOPY
E) CAUSES THE “CORK IN THE BOTTLE PHENOMENON”

FTTFF
WHAT WE’VE COVERED:

• ANATOMY OF THE UPPER AIRWAYS
• DAS ATI GUIDELINES
• LASER LARYNGEAL SURGERY
• FREE FLAP SURGERY

ANY QUESTIONS?
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