Fast-Bleeped: A to E Series – Airway: Stridor

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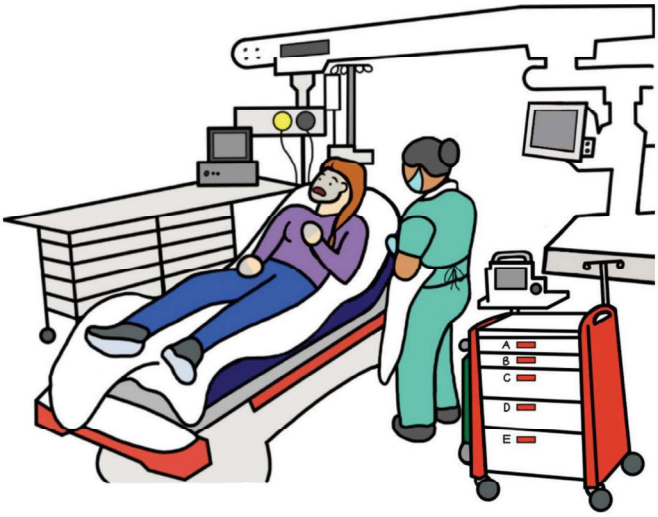
A medical education series comprising practical instructional pieces on how to approach undifferentiated clinical problems in the acute setting.

PRESENTATION

You are a Foundation Year 2 (FY2) doctor working in the Emergency Department (ED) and you have received a pre-alert about a patient "struggling with their breathing". On arrival, you are met with a 43-year-old female with ongoing stridor. The patient appears distressed. The vital signs are:

- Heart rate: 115 beats per minute
- Respiratory rate: 28 breaths per minute
- Saturation: 96% on 15 litres oxygen via a non-rebreathe mask
- Blood pressure: 154/92mmHg
- Temperature: 37.4 degrees Celsius



LEARNING OUTCOMES

- What is your initial approach to the patient presenting with stridor?
- Do you have a working differential diagnosis for this presentation?
- How would you manage this patient if you were the first professional to see them?

WHAT SHOULD BE YOUR INITIAL GENERAL APPROACH TO THIS PATIENT?

Stridor is defined as an inspiratory high-pitched sound occurring due to partial obstruction of the airway. The first thing you must realise is that a stridulous patient is a life-threatening emergency.[1] Patients will often look panicked and uncomfortable.

Immediate senior input is required because the patient may need emergency airway management, possibly including securement of their airway with an endo-tracheal tube (ETT). You should ask someone to fast bleep the on call 'Ear, Nose and Throat' (ENT) team, as well as the on-call airway doctor, who is usually an anaesthetist or an intensive care doctor, who should immediately attend this patient.[2] The patient should be moved to the resuscitation bay of the ED if they are not already there.

You should take a brief handover from the pre-hospital crew. You are particularly interested in finding out whether the patient has had any recent ENT or maxillofacial surgery, any recent medications administered, or any history of allergies or anaphylaxis. Information gathering will help you form your differential diagnosis and enable you to handover to any arriving senior support.

Your initial approach with any unwell patient is to apply high flow oxygen using a non-rebreathe mask attached to 15 litres per minute of oxygen.[2] You also want to connect the patient to a monitor to continuously measure their vital signs. Having alarms appropriately set can give you an early warning to deterioration, for example oxygen desaturation. If you have any help at this point you should delegate the task of vascular access. This will be necessary to administer emergency medications, and delegation of this task will allow you to concentrate on proceeding with your ABCDE assessment.[3]

WHAT SHOULD BE YOUR INITIAL SPECIFIC APPROACH TO THIS PATIENT?

Whilst you wait for senior support to arrive, basic management should be promptly initiated, prioritised using an 'A to E approach'.[3] With this patient, it may be appropriate to sit them forward to improve their position for breathing.[2] Intravenous steroids and nebulised adrenaline are recommended to reduce any inflammation and enhance sympathetic mediated bronchodilatation and vasoconstriction to reduce any potential swelling or laryngoedema and improve their airway patency. An example of a medication regime is detailed below:[2,4]

1. Dexamethasone, 8mg, intravenously (IV) STAT.
2. Nebulised adrenaline, 1ml 1:10,000 in 5ml of 0.9% sodium chloride STAT.

You should attempt to keep the patient calm as this can help prevent the obstruction getting worse. If the patient's peak inspiratory flow is less than the oxygen flow you are supplying, more oxygen is delivered with each breath. You should not attempt to visualise the larynx with nasendoscopy or any medical devices until an anaesthetist or ENT surgeon decides it is appropriate and safe to do so; this is to mitigate any risk to losing the patient's airway without appropriate personnel around.[2]

Sick patients will often present with a worried relative. In a situation where emergency assessment and management is required, it is important for you to control your environment. Whilst it may be beneficial for the relative to stay if they can help keep your patient calm, in some circumstances it will be appropriate for the relative to be more distant from the clinical environment. In this situation, it is important to assign a member of staff to

support the relative, emotionally as well as to provide sufficient and up-to-date information. Always keep in mind that relatives are a source of valuable information as part of a collateral history, in this case you could ask about allergies or a previous history of anaphylaxis.

Although in this case, the patient's problem is in the "Airway" part of the A-E assessment it is important not to neglect other parts of your algorithm in order to identify any additional life threats. You have initiated treatment for the airway and now you must decide whether you can move on to assess the patients breathing, circulation, disability, and exposure before returning to airway and reassessing.

WHAT COULD CAUSE THIS PRESENTATION?

Stridor is an upper airway obstruction. It is useful to approach any patient with stridor in a structured way to form a wide and inclusive differential diagnosis. A summary which highlights the different pathologies which can affect the airway is detailed below in table 1.

WHAT MIGHT YOU CONSIDER IF THIS WAS A PAEDIATRIC PATIENT?

The paediatric airway is smaller. Poiseuille's law states that airway resistance is inversely proportional to the radius of the airway (to the power of 4).[5] Therefore halving the radius would produce a 16 fold increase in the airway resistance. Children have smaller airways to begin with, so are at risk of having a significant increase in airway resistance from even a small amount of obstruction. The most common cause of paediatric stridor is infection such as infective epiglottis or croup.[2] Congenital structural lesions rarely present acutely.[1] The initial approach to a stridulous paediatric patient should be the same as an adult, but the paediatric team will often lead this situation. Severity of stridor should not be judged by the loudness of the stridor, but by decreased level of consciousness and increased respiratory rate.[1]

Table 1: Adapted table highlighting the main pathologies which cause stridor in adult[1, 2, 4]

Pathology	History/Signs	Examination	Management
Deep neck space infection	Sore throat Odynophagia Voice change Rapid onset	Trismus Swelling around neck Stridor Sepsis presentation	Secure airway if compromised Antibiotics Drainage
Laryngopharyngeal carcinoma/malignancy	Sore throat Odynophagia Voice change Weight loss Longer onset	Cachectic Neck lymphadenopathy Lesion may be visualised with laryngoscopy	Secure airway if compromised Surgical intervention
Anaphylaxis	Any allergy Food trigger Recent new drug administration	Stridor Respiratory distress Cyanosis Facial swelling Hypotension	Secure airway if compromised Adrenaline 0.5ml 1:1000 IM Chlorphenamine 10mg IV Hydrocortisone 200mg IV Cardiovascular support
Trauma (fractured or oedematous larynx)	History of trauma Subcutaneous emphysema Haemoptysis	Swelling Abrasions Bleeding	Secure airway if compromised and surgical management
Foreign object	Common in paediatric patients History of choking	Visualisation via nasendoscopy	Secure airway if compromised Removal via bronchoscopy or in theatre
Bilateral vocal cord paralysis	Idiopathic in nature Previous surgery	Visualisation via nasendoscopy will reveal abduction of cords on inspiration	Secure airway if compromised

WHAT HELP ARE YOU GOING TO GET FROM THE ANAESTHETIC AND ENT TEAMS?

An obstructed airway poses a significant challenge to even experienced airway trained doctors. Management is dependent on the urgency of the situation and the complexity of the intervention required. If the airway requires emergency securement a decision on whether the patient can be moved to the operating theatre must be established.[6]

Even with experienced personnel this is a time critical intervention, and a detailed backup plan should always be discussed. Induction of anaesthesia will cause a loss of airway tone, and securement of the airway will need to be achieved in quick fashion to avoid hypoxia. The Difficult Airway Society (DAS) guidelines (see below) advocate a plan A, B, C and ultimately a plan D which involves obtaining Front of Neck Access (FONA) to the airway.[7] The airway doctor should be trained and psychologically prepared to proceed with this without delay in a 'Can't Intubate, Can't Ventilate' scenario. However, in an ideal scenario an experienced ENT surgeon should be scrubbed and ready to perform this procedure because they will likely be the most experienced.[6]

- Plan A: Mask ventilation and tracheal intubation via laryngoscopy
- Plan B: Supraglotic airway device and consider: waking patient up, second attempt at intubation or tracheostomy
- Plan C: Attempt to ventilate via facemask and wake patient
- Plan D: Cricothyrotomy (FONA)

OUTCOME OF CASE

On arrival, you recognised stridor as a medical emergency. You called for senior help early but you were able to start immediate management in the meantime. You applied high-flow oxygen and administered a nebulised adrenaline solution. Intravenous access was gained, and you also administered IV dexamethasone to the patient. This appeared to help with her breathing.

The anaesthetic registrar arrived shortly after you and contacted the ENT surgeons who were luckily on their break in between theatre cases. During this, you had the chance to read the patient's medical notes and discovered that this lady was in fact on the waiting list for removal of a base of tongue tumour and was known to the ENT and maxillofacial teams at your hospital.

The surgeons reviewed her in the ED and decided that an urgent securement of the airway was necessary because they were concerned about potential deterioration. A decision to intubate her in theatre and exploration of the base of tongue tumour is made with a potential for a tracheostomy. The ENT team consented the patient for this just in case. The anaesthetic team decided that the best way forward was to proceed with an awake fibreoptic intubation, where they were able to secure her airway whilst awake using a specialist scope with a camera. By keeping her awake, airway reflexes are maintained. Induction of anaesthesia only occurs once the ETT is correctly positioned inside the trachea. During pharyngoscopy, the ENT surgeons decided to postpone resecting her base of tongue tumour and performed a tracheostomy to bypass the upper airway obstruction and give the patient a secure and definitive airway. This was to allow time for multidisciplinary team discussion and planning of more complex upper airway surgery.

KEY LEARNING POINTS

- Stridor is a life-threatening presentation and requires urgent management
- Nebulised adrenaline and intravenous steroids are appropriate initial managements before invasive procedures such as intubation and surgery
- There are a variety of pathologies that affect the airway, so examination and history are vital to devising a differential diagnosis

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