

# Evaluation and management of acute upper airway obstruction

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## Abstract

Upper airway obstruction can occur suddenly and result in a patient's rapid deterioration. In this article we provide a structured approach to identifying those patients with acute airway compromise and stratifying them according to clinical urgency. This includes ways of distinguishing both the level of obstruction and its severity, based on the clinical signs and symptoms, and the role and timing of investigations. We describe the key aspects of emergency management, including temporizing measures and airway adjuncts. Management of rare, but important, situations are discussed such as post-thyroidectomy haematoma, occlusion of tracheostomy and laryngectomy stomas and post-obstruction pulmonary oedema (POPE) is discussed. We describe the situation when an emergency surgical airway should be considered, along with our technique of performing one.

**Keywords** Foreign bodies; respiratory sounds; tracheostomy; upper airway obstruction

## Introduction

Airway obstruction is perhaps one of the most feared emergencies. This may be due to the speed with which it can occur and the resulting rapid deterioration. Appropriate management of the airway forms the first step of all resuscitation protocols. Consequently, it is vital to have a systematic approach to evaluating the airway as well as a robust set of management principles. The clinical situations in which upper airway obstruction should be considered include:

- anaphylaxis
- trauma (surgical and non-surgical)
- inhalation injuries, both caustic and burns
- head and neck infections especially if there is associated shortness of breath
- inhaled or swallowed foreign bodies
- laryngeal and pharyngeal malignancy.

Here we present a structured approach to assessing acute upper airway obstructions and discuss its immediate management.

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For the purposes of this review, the upper airway refers to the air conducting passages from the nasal and oral cavity to the level of the carina. In addition, we will be focussing on the adult airway. The anatomy of the head and neck is discussed elsewhere in this journal.

## Evaluation

Often the various elements of evaluation will occur synchronously, either by oneself or alongside other members of the team. However, for the purpose of this review, we have split it into the traditional subheadings.

It is important to remember that airway compromised patients can shift quickly between different priority levels. Consequently, evaluation should be a dynamic process and management adjusted accordingly. Reevaluating the situation regularly is crucial to identifying deterioration and acting upon it in a timely manner. Assessment can frequently be challenging by the fact that the resultant hypoxia leads to confused, unco-operative patients.

## History

The likelihood is that in the event of severe acute airway obstruction, immediate airway intervention will take precedence over a thorough history. A rapid handover from emergency staff or bystander, while interventions are taking place, may need to be sufficient. The key aspect of this history is to identify factors that could lead to a rapid deterioration, such as smoke inhalation, trauma or evidence of severe infection. A more complete history can be obtained later.

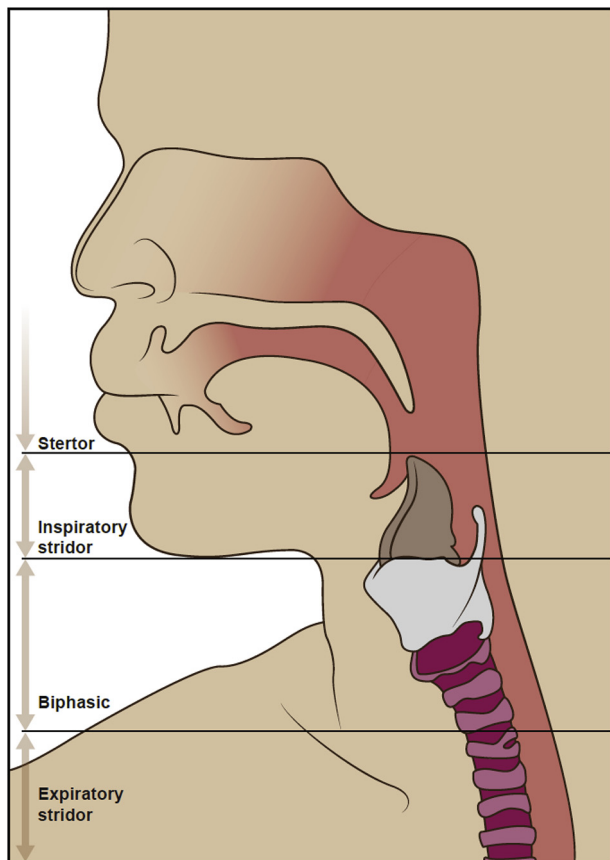
When possible, try to ascertain the nature of the breathing difficulty. When did it start? Is it getting better or worse? Can they think of anything that might have triggered it? Is there any position that makes it worse? Ask about associated symptoms such as: cough, dysphonia, dysphagia, pain, neck stiffness, fever or recent weight loss. The history of preceding events can provide essential information, in particular any history of trauma, smoke inhalation (possibility of airway burns), foreign body ingestion or infection. It is important to note that in a patient with subglottic stenosis the voice is likely to be normal.

Assessment of the patient's detailed past medical history should only be attempted once the patient has been stabilized. Important aspects include previous similar episodes, airway or neck surgery or known or suspected lung or thyroid pathology. In children, a birth and perinatal history is essential. Ensure that you have a record of their medications, including illicit drug use, and document their smoking status and alcohol consumption (this has particular implications if malignancy is suspected).

## Examination

The first step is to do an 'end of the bed' assessment to establish how unwell the patient is. If there are any concerns, call for senior help. Asking the patient how they are feeling will provide a rapid assessment of their level of consciousness as well as the degree of airway compromise and shortness of breath.

Listen carefully for additional airway noises such as stridor, stertor and wheeze. This will give clues to the level and nature of the airway obstruction (Figure 1). However, the subtleties may be difficult to distinguish in the acute setting, especially if there is



**Figure 1** Anatomical correlation of the different abnormal upper respiratory tract noises

background noise. It is important to remember that the absence of additional airway noises, such as stridor, does not exclude airway pathology, for example, subglottic stenosis. Examples of the different pathologies that can cause airway noises are summarized in [Table 1](#).

Stertor is the abnormal airway noise created by turbulent flow through the naso and oropharynx and, occasionally, the supra-glottis. It is commonly described as a low-pitched, snoring noise. It is best to ask the patient to breathe through an open mouth to exclude pathology in the nasal cavity or nasopharynx that may be responsible for the noise.

Stridor refers to the abnormal airway noise that is created by turbulent air flow through a partly narrowed airway, typically from the supraglottis to the subglottic area. It is usually described as being high pitched; however, the precise tonal characteristics depend on the location of the obstruction and the underlying pathology. It can be either inspiratory, expiratory or biphasic.

Ensure that a full set of basic observations is obtained, including heart rate, respiratory rate, temperature, blood pressure and oxygen saturations. Interpret oxygen saturations with caution. Patients with airway obstruction are at risk of developing worsening respiratory acidosis and consequent CO<sub>2</sub> narcosis. If these patients are on supplemental oxygen, the oxygen saturation may remain in the high 90s right up until they desaturate rapidly. It is important to bear in mind that the combination of tachycardia and a rapid respiratory rate are signs of hypercapnia and therefore indicate significant airway compromise.

Look for evidence of accessory muscles of respiration being used as well as subcostal recession and tracheal tug. Palpate the neck and examine for range of movement. If possible, examine

### Examples of pathologies associated with additional airway noises

| Type of airway noise | Level of obstruction         | Acute onset   | Acute on chronic   |
|----------------------|------------------------------|---|--|
| Stertor              | Tongue base/oropharynx       | Foreign body<br>Peritonsillar abscess<br>Parapharyngeal and retropharyngeal abscess<br>Anaphylaxis  | Adenotonsillar hypertrophy<br>Tongue base malignancy         |
| Inspiratory stridor  | Supraglottic                 | Airway Burns<br>Anaphylaxis<br>Epiglottitis/supraglottis<br>Parapharyngeal abscess<br>Retropharyngeal abscess<br>Laryngotracheobronchitis | Laryngomalacia<br>Malignancy<br>Papilloma                    |
| Biphasic stridor     | Glottis/immediate subglottis | Airway Burns<br>Trauma<br>Vocal cord pathology<br>- Inflammatory<br>- Post-surgery<br>- Prolonged intubation                              | Thyroiditis/haemorrhage into cyst<br>Malignancy<br>Papilloma |
| Expiratory stridor   | Trachea                      | Tracheitis<br>Trauma<br>Airway Burns  | Tracheomalacia<br>Malignancy                                 |

**Table 1**

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