Principles of Urgent Management of Acute Airway Obstruction

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KEYWORDS

• Airway obstruction • Foreign bodies • Complications • Tracheostomy • Laryngoscopy

KEY POINTS

- Have knowledge of features of airway compromise and identify and treat patients with airway obstruction early.
- Use of simple airway maneuvers will often achieve a patent airway. Oxygenation is important; try to provide a high oxygen concentration.
- Delivering oxygen at the mouth that does not reach the alveolus is not a treatment for airway obstruction. Recognize the dangerous sequelae of hypoxia and aspiration.
- Call for help early and prepare for intubation in a timely fashion. Always be ready to perform tracheostomy and/or surgical tracheal intubation/tracheostomy.

INTRODUCTION

By appreciating the causes of an obstructed airway, treatment with oxygen and other simple maneuvers can be delivered swiftly, preserving airway patency and passage of oxygen to the lungs for ventilation. Airway obstruction results in hypoventilation, increased work of breathing, and impaired gas exchange with the development of hypercarbia and ultimately hypoxemia if left unresolved.

Obstruction may be partial or complete, depending on the mechanism or cause. Complete airway obstruction will rapidly cause hypoxia and cardiac arrest, whereas partial obstruction may be more insidious in onset. Reduced alveolar ventilation in the obtunded patient and the obstructed airway leads to hypercapnea, respiratory acidosis, and hypoxemia. Noisy breathing characterizes a partially obstructed airway, and complete absence of airway noises points to total airway obstruction.

In this article, the upper and lower airways' anatomy, airway reflexes, airway obstruction, and the related treatment methods are discussed and the updated literature is reviewed. The literature is summarized in **Tables 1** and **2**. After discussing the topic in the light of literature, principal steps for the urgent management and handling of airway obstruction are presented in an algorithm.

ANATOMY AND PHYSIOLOGY

Functional Anatomy

Most airways are deformable, not rigid, and are affected by mechanical forces and pressures impinging on the wall.[1] Muscle, blood vessels, and glands in the airway wall are under local and reflex control, and actively respond to changes in the internal and external environments.

The respiratory tract is divided into 2 broad divisions: the upper and lower airways. The upper airways (**Fig. 1**) consist of the extrathoracic structures from the nares and mouth down to, and including, the larynx. The lower airways (see

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Table 1
Urgent airway obstructions (FB) and retrieval processes

Age	Location	Cause of Obstruction	Symptoms/Signs	Procedure	Reference
<3 y	Laryngotracheobronchial (the right bronchus (61.4%), left main bronchus (31.6%), trachea (5.3%), larynx (1.7%)	Toys, sweets, batteries, jewels, rocks, and magnets	• Shortness of breath • Stridor, cyanosis • Cough, fever, and, chest rhonchi	Bronchoscopy	Amer et al,[21] 2017
4 y and 5 y	• Hard palate • 2 cm over the cricothyroid membrane	Penetrating FBs • A metal rod • A pencil	• Agitated child in open mouth posture • Swollen neck and difficulty in breathing	Orotracheal intubation and orotracheal intubation + midlevel emergency tracheostomy	Edem et al,[22] 2017
Mean age 3.7 y	The main stem bronchus (62.5%)	Airway FBs	—	Tracheostomy (5.7%) and bronchoscopy (65.4%)	Roberts et al,[23] 2017
0.6–18.8 y	Airways	Airway FBs	Complicated (19.6%)	Bronchoscopy	Sjogren et al,[24] 2017
31.2 mo (average)	Airways	FBs (71% organic)	Complicated with secondary airway infection (44%)	Rigid laryngobronchoscopy	Gruber et al,[25] 2017
Pediatric patients	Airways	Airway FBs (nuts, beans)	—	Mini grasping basket forceps + ultrathin flexible bronchoscope	Hata et al,[27] 2017
A 13-month-old boy	Trachea	Nuts	Pulmonary edema	Bronchoscopy + intubation	Bashir et al,[41] 2017
<18 y	Tracheobronchial	FBs	—	NIV + sedation + flexible endoscopy (short length)	Soong et al,[28] 2017