

## Prevention and Management of Medical Emergencies in Dental Practice.

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  - Reference: Chapter 2 (Prevention and Management of Medical Emergencies.)
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Medical emergencies is an important topic, yet its occurrence is rare in the dental practice. We, as dentists, must have an adequate knowledge concerning such a topic, be prepared to deal with such situations in case we encountered one and be able to manage the patient safely and correctly. (Adequate knowledge on how to deal with patients is a must✓.)

A study found that every dentist might encounter **only one medical emergency** over a period of 10 years, which is considered **low**.

Medical emergencies happen suddenly but can be expected✓.

**The best management is the PREVENTION of medical emergencies**; because it's difficult to deal with medical problems, we have to do our best to prevent their occurrence.

- How to prevent?
  1. By identifying the patients who are at risk and assessing the severity.
  2. By preparing the patient well, otherwise, you are considered negligent medico-legally. **The patient has to be prepared in relation to the type of procedure intended to be performed and disease status.**

You have to take a good history from the patient. **Every single part of history could be of medical significance.**

Some preventive measures are related to specific diseases, e.g. diabetes.

- A diabetic patient should eat his breakfast and take his medication prior to the dental appointment. Keep in mind that this is **not** applicable for all patients; meaning that, this could work in simple extraction cases or **any procedure that will not interfere with the normal oral intake**. In the morning, the patient takes his hypoglycemic drug or long-acting insulin as well as his carbohydrate intake (breakfast), after the extraction procedure, **the effects of both insulin and carbohydrates are still there, thus no complications will be encountered**. On the other hand, when performing extensive procedures for a diabetic patient, such as, extraction of 10 teeth, the patient will **not** be able to eat well after the procedure → **no carbohydrate intake, BUT the hypoglycemic drug/insulin is still acting!** → **In the evening, the patient will become hypoglycemic.**

**Local/General anesthesia should never be administered UNLESS the patient is in a SUPINE POSITION**. This position allows the blood to reach the brain even if there is

pooling of blood in the skeletal muscles, thus, minimizing the incidence of medical emergencies, particularly the *vasovagal syncope; simple faint*.

- NO oxygenated blood reaching the brain for more than 5 minutes → Death.
- The patient should never be left unattended.

Before performing any stressful procedure, a **medical emergency kit** should be present, which contains: oral and nasal airways, clear face-masks, large suction tips, IV cannula, IV fluids and variety of drugs:

- Flumazenil: specific benzodiazepine receptor antagonist.
- Atropine: reversal of sedative agents → Simple faint cases✓.
- Glucose, which is available in many different forms; unconscious patient → IV/IM.
- **Adrenaline: the drug of choice for many diseases especially in (1) cardiac arrest, (2) asthma and (3) anaphylactic shock → LIFE-SAVING✓.**
- Hydrocortisone → Anaphylactic shock✓.
- Diazepam
- Glyceryl TriNitrate (GTN) → Angina patients✓

**(Automated external defibrillator (AED) → The gold standard for treating patients with cardiac arrest✓.)**

## COLLAPSE

**A sudden, generalized loss of strength without loss of consciousness.**

- Loss of the muscular tone.
- The initial phase of any emergency.

It can be followed by a loss of consciousness, which could be as a result of:

1. **Vasovagal syncope = Simple faint.**
2. **Diabetes = Hypoglycemia.**
3. **Anaphylactic shock.**
4. **Adrenal crisis.**

(1-4 are the most common causes of collapse in the dental practice)

In any emergency; maxillofacial trauma, infections...etc, you must perform the ABC's:

**A: Airway**

**B: Breathing**

**C: Circulation**

- Maintain an **intact airway** and the **normal breathing and circulation**✓.
- **NOT stable? → Support them** ✓✓✓

## Box 2-3 Basic Life Support

### ABCs

- A—Airway
- B—Breathing
- C—Circulation

### Airway Obtained and Maintained by Combination of the Following:

1. Extending head at the neck by pushing upward on the chin with one hand and pushing the forehead back with other hand
2. Pushing mandible forward by pressure on the mandibular angles
3. Pulling mandible forward by pulling on anterior mandible
4. Pulling tongue forward, using suture material or instrument to grasp anterior part of tongue

### Breathing Provided by One of the Following:

1. Mouth-to-mask ventilation
2. Resuscitation bag ventilation

### Circulation Provided by External Cardiac Compressions

Example: a patient collapsed in your clinic, his medical history says that he is fit.

- The first thing that should come to your mind is the ***vasovagal syncope*** (the most common cause of any medical emergency in the dental practice). **And your management should be placing the patient in a supine position (unless the medical history contraindicate that, e.g. heart failure, severe asthma.)** → within minutes the patient should recover✓.
- **NO recovery or any improvement** → **Reconsider your diagnosis** → ***Hypoglycemia*** (the second most common cause of any medical emergency in the dental practice). → **Gluco-Chek**✓.



A. Conscious patient → Sweets

B. Unconscious patient → IV Dextrose or IM Glucagon

**(Supine position + No signs of improvement → the cause is NOT vasovagal syncope.)**

- The patient is not hypoglycemic; normal blood glucose levels → then it is either **adrenal crisis or anaphylactic shock** (each one of the two has its specific features which will indicate the diagnosis.)

How to approach a patient with a medical emergency?

1. Check the **vital signs**; pulse, blood pressure, respiration and temperature.
2. When all the vital signs check normal, progress to identifying the etiology of emergency. If one or more of the vital signs are not normal, you must support them. **ABC's have to be supported and stabilized first, only then you may proceed to the identification of the etiology; because they are far more important in saving the patient's life!**

**VASOVAGAL SYNCOPE (SIMPLE FAINTING)**

Most of the vasovagal attacks are neurally-mediated; caused by neural excitation which could be due to stress or phobia. Phobia from a specific stimulus → sympathetic action → vasoconstriction + decreased blood pressure.

It may be caused by a vascular problem, e.g. hypotension → Pale mucosa (white tongue and pale skin) + the patient is cold and sweaty + **tachycardia; to compensate for the sudden drop in the blood pressure.**

- Treatment of choice: place the patient in a supine position in order to allow the blood to reach the brain and to prevent cerebral hypoxia from happening.
- **Most of the patients are conscious unless the patient was not managed then loss of consciousness occurs.**
- You, as a dentist, should NOT panic. Follow the general guidelines for the management of medical emergencies.

**Management of patient showing symptoms or signs of syncope**

**Prodrome:**

1. Terminate all dental treatment.
2. Position patient in supine posture with legs raised above level of head.
3. Attempt to calm patient.
4. Place cool towel on patient's forehead.
5. Monitor vital signs.

**Syncopal episode:**

1. Terminate all dental treatment.
2. Position patient in supine posture with legs raised.
3. Check for breathing.

**If absent:**

4. Start basic life support.
5. Have someone summon medical assistance.
6. Consider other causes of syncope, including hypoglycemia, cerebral vascular accident, or cardiac dysrhythmia.

**If present:**

4. Crush ammonia ampule under nose, administer O<sub>2</sub>.
5. Monitor vital signs.
6. Have patient escorted home.
7. Plan anxiety control measures during future dental care.

Figure 2-9 Management of vasovagal syncope and its prodrome.

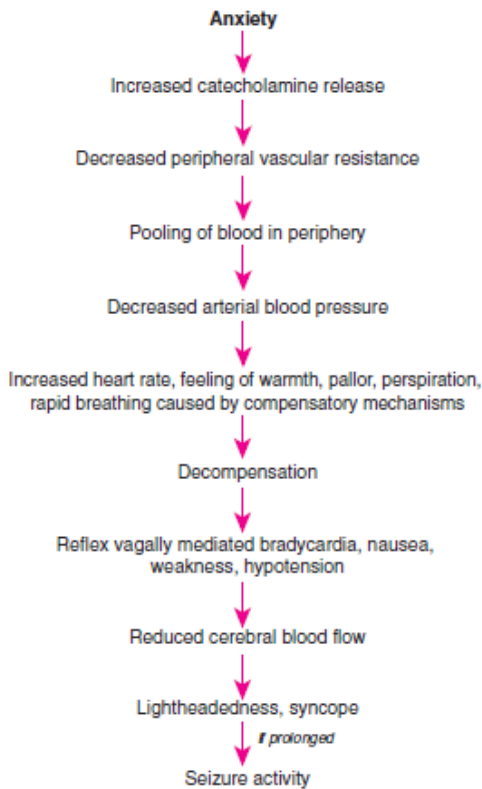


Figure 2-8 Pathophysiology and manifestations of vasovagal syncope.

## ANAPHYLACTIC SHOCK

A reaction between an antigen (allergen) and an antibody (**IgE** on mast cells). → Degranulation of mast cells → release of inflammatory mediators → Edema; **laryngeal edema and constriction**. (Very significant!)

**Anaphylactic shock = bronchoconstriction (wheezing) + laryngeal edema.**

- **Type I hypersensitivity reaction.**
- **The most common antigen in the dental practice is Penicillin.**
- 10% of people allergic to Penicillins are allergic to Cephalosporins.
- 2% of people allergic to Penicillins are allergic to NSAIDS.

If Cephalexin is the only antibiotic present, should it be given to the patient?

Yes, you can give it to the patient although there's a cross hypersensitivity reaction, this is considered a malpractice, but you can justify such an action only if the patient's history suggests that his allergy is **mild**, then the likelihood of developing an anaphylactic shock after taking Cephalexin is low. On the other hand, a patient with a history of **severe** anaphylactic shock, should NOT be given Cephalexin.

- You should be careful before prescribing any medication to patients allergic to Penicillins or any drug, e.g. **asthmatic patient → high susceptibility to hypersensitivity reactions to medications.**

**The most common drugs involved in hypersensitivity reactions:**

1. **Penicillins**
2. **Muscle relaxants**
3. **NSAIDS**

- Anaphylactic shock could be mild, moderate or severe. **The faster the onset of the anaphylactic shock, the more severe it is;** within seconds → severe and life-threatening, within half an hour → very mild.
- The drug of choice is: **Epinephrine** → Life-saving!  
WHY? Because it is a **bronchodilator**.  
HOW? **IM** by using an **Epi-Pen**; Epinephrine auto-injector✓.



(Why not IV? It might lead to contraction of the heart muscle leading to a cardiac arrest and IM injections a more easily administered using the Epi-Pen.)

WHERE? In the **anterolateral aspect of the thigh** → ***Vastus Lateralis*** muscle,  
WHY? Because it is **bulky and highly vascularized**.

- Give the patient epinephrine, **corticosteroids to relieve the laryngeal edema**, as well as, antihistamines, e.g. Chlorphenamine.
- The patient **should be admitted to the hospital for at least 24 hours**; because hepatic recirculation of the drug might occur leading to another anaphylactic shock.
- As was mentioned, prevention is always better than the cure and taking a good history is a must before any treatment.
- Patient with risk of allergy → **avoid any contraindicated medications and anything that might induce an anaphylactic shock.**
- **Anaphylactic shock✓** → **Supine position + Epinephrine** (The drug of choice; life-saving.)

# CARDIAC ARREST

The heart stops doing its function.

Signs and symptoms:

1. **Loss of consciousness**
2. **No circulation (pulse)**
3. **No breathing**

(Always keep in mind that if there was NO breathing for more than 4-5 minutes then there is NO circulation.)

**The most common cause is Ischemic Heart Disease (IHD)**, such as, history of myocardial infarction or angina, and prosthetic heart valve, **which causes Ventricular Fibrillation (VF)**.

The gold standard for treating such patients is by using **the defibrillator**.

Steps of management: (the sequence is important)

## 1. **Check the responsiveness of the patient. (Shake and shout)**

If the patient was irresponsive, then you have to check the breathing, if it was adequate, you position the patient in the recovery position, if not, check the circulation, if it is present, then perform mouth-breathing and recheck the pulse. If there was no circulation → no blood reaching the brain, very dangerous → shout/call for help, because the faster a defibrillator is brought, the more there is a chance in saving the patient's life.

Note: Unconscious + NO breathing + Circulation✓ → NOT A CARDIAC ARREST.

## 2. **Confirm** that the patient is having a cardiac arrest.

## 3. **Call/shout for help immediately.**

In specific situations, we need to perform one minute of resuscitation (CPR) before calling for help, such as in children with a trauma or drowned patients, but why?

Because in the case of a drowned patient, you can get rid of the water in the lung, and in trauma situations you can relieve the obstruction/foreign body. **Thus, solving the problem lies in getting rid of the cause, and in these cases the cause is obvious and manageable. But in the cases that are caused by IHD and VF the gold standard for the treatment is the defibrillator, that's why you have to call/shout for help first.**

## 4. **Try to restore the normal function.** Circulation and breathing can be brought back to normal by following the basic life support guidelines. Start by **compressing the chest and ventilating the patient** (30 compression : 2 ventilation) until you are exhausted or help is reached. **However, if you perform that optimally, you will not achieve more than 20% of the normal circulation.**

- Aim for 100 compressions/min.

- While performing mouth-breathing, **close the patient's nose**, otherwise, what you are doing is pointless. Is there a risk of Hepatitis or HIV transmission? There is, but it is **negligible**. It is preferable to take precautions✓.
- 5. Advanced life support is similar to basic life support but with more advanced measures; instruments and devices that address the circulation (**defibrillation, if shockable**) and breathing (**endotracheal intubation**). Once help is reached, they use the ECG to check the rhythm of the heart and detect if it is shockable or not.

## HYPOGLYCEMIA

Blood glucose is below the normal reference range. ( < (55-60) mg/dL )

### Causes:

1. Missed meal.
2. Excessive medication (insulin).
3. Increased caloric need due to exercise.
4. Combination of the above.

You can prevent hypoglycemia by avoiding the predisposing factors. The patient should take his medications and have an adequate carbohydrates intake.

**It is easy manageable, yet very dangerous and might lead to death.**

### Signs and symptoms:

1. **Hypotension.**
2. **Aggressiveness and agitation.**  
Due to low sugar levels in the brain → excitation.

**You can give the patient glucose in any available form, if conscious. If unconscious, give the patient IV dextrose or IM glucagon.**

Box 2-12 Manifestations of Acute Hypoglycemia	
<b>Mild</b>	<ul style="list-style-type: none"> <li>• Hunger</li> <li>• Nausea</li> <li>• Mood change</li> <li>• Weakness</li> </ul>
<b>Moderate</b>	<ul style="list-style-type: none"> <li>• Anxiety</li> <li>• Behavior change: belligerence, confusion, uncooperativeness</li> <li>• Pallor</li> <li>• Perspiration</li> <li>• Tachycardia</li> </ul>
<b>Severe</b>	<ul style="list-style-type: none"> <li>• Hypotension</li> <li>• Seizures</li> <li>• Unconsciousness</li> </ul>



## Management of acute hypoglycemia

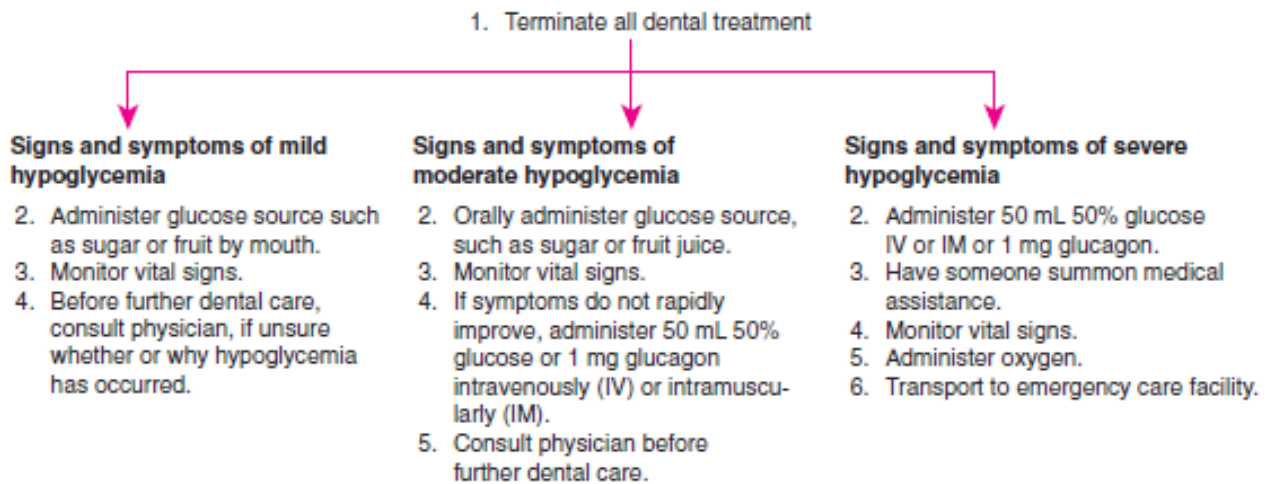


Figure 2-11 Management of acute hypoglycemia.

## ACUTE ASTHMATIC ATTACK

The patient already has an asthma ✓.

Asthma could be mild, moderate or severe. **Severe asthma is life-threatening.** How can you tell if the patient has a severe asthma?

1. Medication itself might suggest the severity → Corticosteroids = severe.
2. Loss of consciousness.
3. Inability to speak one full sentence.

**ALWAYS** treat the patient in an UPRIGHT POSITION.

The drug of choice is **Epinephrine**. Can be supported by **Hydrocortisone**.

Never treat the patient unless his inhaler is present, because stressful events may induce an asthmatic attack.

### Box 2-6 Manifestations of an Acute Asthmatic Episode

#### Mild to Moderate

- Wheezing (audible with or without stethoscope)
- Dyspnea (i.e., labored breathing)
- Tachycardia
- Coughing
- Anxiety

#### Severe

- Intense dyspnea, with flaring of nostrils and use of accessory muscles of respiration
- Cyanosis of mucous membranes and nail beds
- Minimal breath sounds on auscultation
- Flushing of face
- Extreme anxiety
- Mental confusion
- Perspiration

### Patient with shortness of breath or wheezing

1. Terminate all dental treatment.
2. Position patient in fully sitting posture.
3. Administer bronchodilator by spray (metaproterenol, isoproterenol, epinephrine).
4. Administer oxygen.
5. Monitor vital signs.

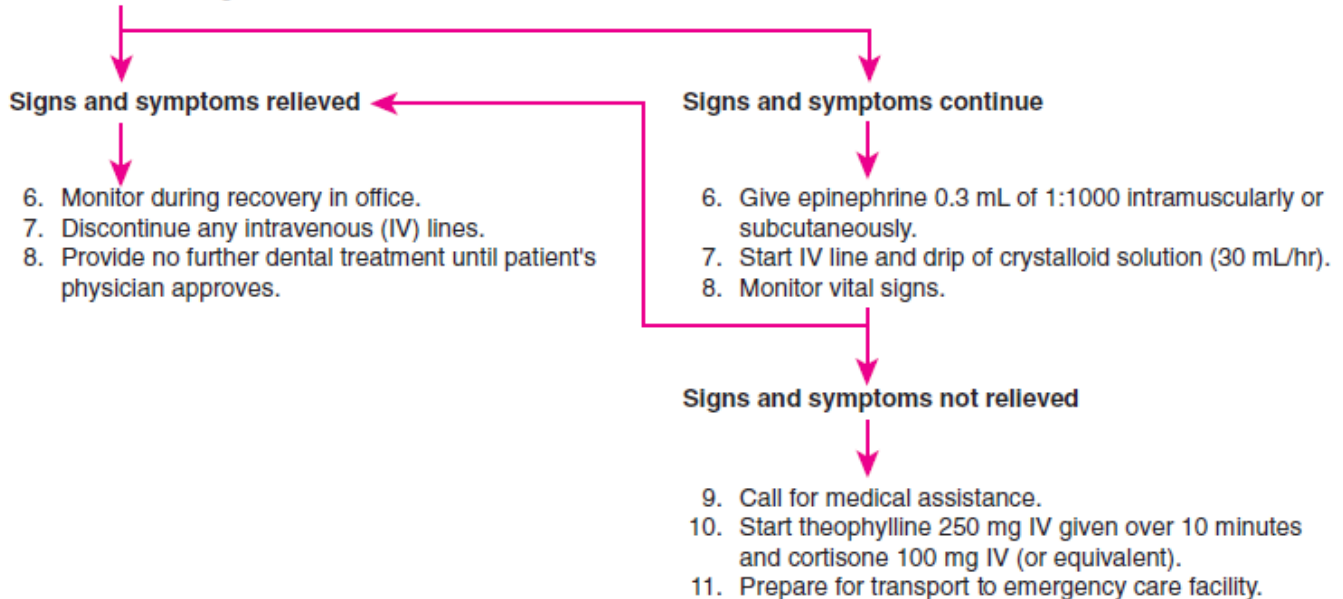


Figure 2-4 Management of acute asthmatic episode occurring during dental surgery.

## FOREIGN BODY ASPIRATION

= FOREIGN BODY RESPIRATORY OBSTRUCTION = UPPER AIRWAY OBSTRUCTION

Instruments, such as files, or even bridges can be inhaled/swallowed.

Aspiration of sharp objects increases the likelihood of developing complications.

If **any sign** of airway obstruction was seen, you have to **immediately stop your procedure.**

Management:

1. Open the mouth widely.
2. Suction the oral cavity.
3. Clear the airway.
4. **If you see the foreign body try to grasp it by your hand, if that wasn't possible, push the chest up (Heimlich maneuver) to induce a cough reaction to clear the airway, if that wasn't helpful, you go for an endoscopy.**
  - **No persistent cough + No agitation → the object is in the esophagus.**
  - **Severe persistent cough → the object reached the nasopharynx, in the lung → might need a bronchoscopy or even deep chest surgery.**

5. The best way to locate the object is by taking **two X-ray images with two different angles** and then you refer the patient to a GI specialist to manage the case with what is suitable. (**Endo files → Laparotomy.**)

**Box 2-9 Acute Manifestations of Aspiration into the Lower Respiratory Tract**

**Large Foreign Body**

- Coughing
- Choking sensation
- Stridorous breathing (i.e., crowing sounds)
- Severe dyspnea
- Feeling of something caught in throat
- Inability to breathe
- Cyanosis
- Loss of consciousness

**Gastric Contents**

- Coughing
- Stridorous breathing
- Wheezing or rales (i.e., cracking sound) on chest auscultation
- Tachycardia
- Hypotension
- Dyspnea
- Cyanosis

**Large foreign body enters trachea or bronchus (e.g., tooth, dental instrument, crown)**

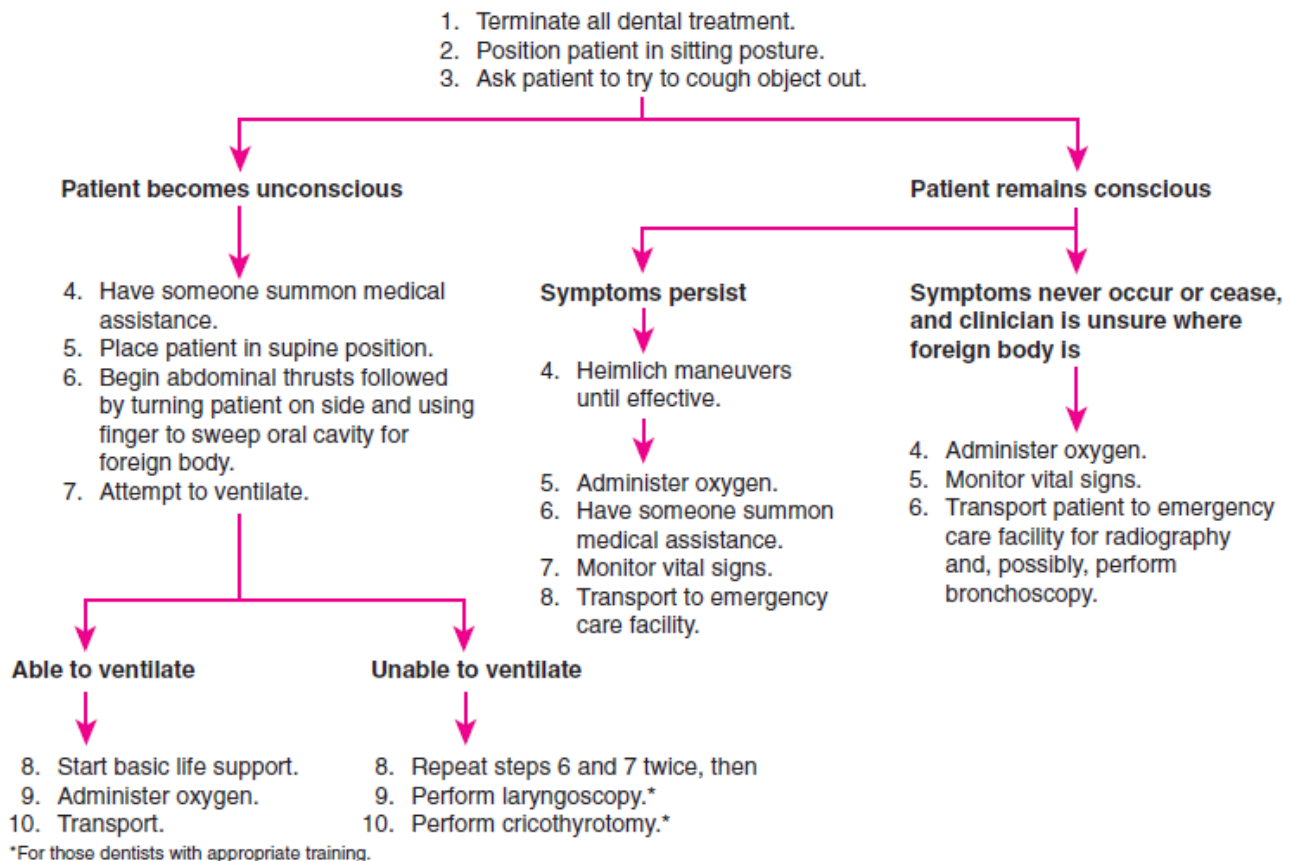


Figure 2-6 Management of respiratory tract foreign body aspiration in patient undergoing dental surgery.