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## Management of Airway Obstruction

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### CONTENTS

INTRODUCTION
ETIOLOGY
PREVENTION
PEDIATRIC ISSUES
RECOGNITION
EVIDENCE-BASED TREATMENT OF CHOKING
TECHNIQUE
MANAGEMENT RECOMMENDATIONS
COMPLICATIONS
SUMMARY
REFERENCES

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### INTRODUCTION

Death by acute airway obstruction has been recognized for centuries. George Washington is thought to have died in 1799 from upper airway obstruction caused by acute bacterial epiglottitis (1). Although letting of more than 2 L of blood out of their patient, President Washington's physicians apparently discussed performing a tracheotomy, a procedure that had been described in detail only the year before. However, they did not have the courage to carry out the new procedure on the retired president of the United States. Dr. R. K. Haugen wrote a now-classic description of the problem of choking in 1963 (2). He described what he termed the café coronary:

*A middle-aged or elderly person, at a fashionable restaurant, is partaking of filet mignon, or perhaps broiled lobster or prime rib of beef. At the same time, he is conversing with companions at dinner. Suddenly, he ceases to eat and talk. The dinner companions are perplexed but not alarmed for there is no indication of distress. Then, the person suddenly collapses at the table.*

Dr. Haugen then described an unsuccessful attempt at resuscitation. In his article, he detailed nine similar cases. The food found in the airway was steak in four cases, beef in two, ham fat in one, kippered herring in one, and broiled lobster in the last (2). In his conclusion, he noted "the only effective means of treatment is an emergency, on the scene, tracheotomy." Acute airway obstruction is an uncommon cause of sudden cardiac

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Table 1  
Deaths From Choking in the United States: 1999

<i>Age range (years)</i>	<i>Deaths</i>	<i>Death rate per 100,000</i>
Under 1	46	1.2
1–4	76	0.5
5–9	23	0.1
10–14	16	0.1
15–19	12	0.1
20–24	23	0.1
25–34	61	0.2
35–44	123	0.3
45–54	202	0.6
55–64	239	1.0
65–74	506	2.8
75–84	984	8.1
Over 85	1157	27.7
<b>All ages</b>	<b>3468</b>	<b>1.2</b>

From the CDC and Prevention WONDER search tool of deaths in 1999 from ICD-10 code W79 (inhalation and ingestion of food causing obstruction of respiratory tract) and W80 (inhalation and ingestion of other objects causing obstruction of respiratory tract [3]).

arrest (CA). However, it is frequently treatable, if recognized in time. Accidental choking killed 3468 persons in the United States in 1999. The problem primarily affects the young and the elderly. There were about 1.2 deaths per 100,000 infants from acute airway obstruction recorded annually in the United States; but after dropping in childhood and young adulthood, the rate rises dramatically in old age reaching 27.7 per 100,000 adults aged greater than 85 (*see* Table 1 [3]). Despite widespread education on the use of the Heimlich maneuver and other techniques for treatment of acute airway obstruction, the death rate remains stable.

## ETIOLOGY

Acute airway obstruction can be caused by either an intrinsic or extrinsic blockage to airflow. A wide variety of objects, both living and inanimate, have been identified as the cause acute airway obstruction. Intrinsic blockage can be caused by the tongue, the epiglottis, blood, tumors, or stomach contents. The most common extrinsic object is improperly chewed food, usually meat in adults. Adults with pre-existing dysphagia are at an increased risk of death by choking.

Adults often choke during a meal that includes the consumption of alcohol. They do not chew the food into pieces small enough to prevent obstruction of the glottic opening. They often talk and chew during the process of swallowing or inhaling; the food becomes lodged in the glottis completely obstructing airflow. If the blockage is not removed in a few minutes, the reservoir of oxygen present in the lungs from the last good breath will be depleted. Once the individual becomes hypoxic, loss of consciousness will ensue, and

death will soon follow. Children also choke on pieces of food and on small objects found in their immediate environment such as coins, small balls, balloons, and small pieces of larger toys.

In 1994, Drs. Andazola and Sapien conducted an epidemiological survey of pediatric choking episodes in Albuquerque, New Mexico. There were 103 emergency medical services (EMS) calls for obstructed airway in children less than 15 years of age (5). Forty percent occurred in children less than 1 year old, 50% in children between 1 and 5 years of age, and 10% in children older than 5. Seventy-eight percent of the children under the age of 1 self-cleared their airway or had their airway cleared prior to EMS arrival, compared with 89% of those between 1 and 5, and 100% of those older than 5. Because 52% of the patients whose obstructions resolved were not transported to the hospital, the incidence of choking may be underestimated as frequently only patients who present at the emergency department are included in choking estimates.

## PREVENTION

Prevention of choking begins at home. Children should be taught to chew food thoroughly so that the habit becomes ingrained by adulthood. Chewing food with the mouth closed is not only polite but also inhibits inhalation through the mouth thereby preventing food from being pulled into and obstructing the glottis. Consumption of alcohol in excess during meals also increases the chances of choking and should be avoided. Improperly fitted dentures inhibit effective chewing and may also detach and obstruct the glottis.

## PEDIATRIC ISSUES

More than 17,000 children 15 years of age or younger were treated for choking episodes in emergency departments in the United States during the year 2000. This translates to a rate of 29 per 100,000 people (4). Less than 1% died. More than half were choking on food, including hard candy and gum, and about 13% were choking on coins. The Centers for Disease Control (CDC) maintains a web site devoted to choking prevention at [www.cdc.gov/ncipc/duip/spotlite/choking.htm](http://www.cdc.gov/ncipc/duip/spotlite/choking.htm).

Toddlers should not be fed peanuts, grapes, raw carrots, whole or large sections of hot dogs, meat sticks, or hard candies (5). Additionally, young children should not be permitted to run with food in their mouths. Rather, they should be seated with an adult present during meals.

Although anyone who has supervised a toddler knows the challenges involved with monitoring their activities, adults need to work to keep the environment around the small child clear of objects such as coins, small balls, and rubber balloons that can cause choking (6). In general, toys that can fit through a toilet paper tube should be kept away from young children (7). The US Consumer Product Safety Commission has established standards for labeling toys to prevent choking episodes. Toys with parts smaller than 1.75 inches in diameter must be labeled with the phrase "WARNING: CHOKING HAZARD—Small parts. Not for children under 3 yrs."

Toy rubber balloons and similar conforming objects represent a significant risk for choking in older children (6,8). The caps and other parts of inexpensive ballpoint pens are also a well-recognized choking hazard in older children who may walk about school and home with the pens in their mouths (9).

## RECOGNITION

At times, choking is easy to recognize. However, at other times it can be confused with simple fainting, sudden CA, stroke, seizure, or drug overdose. Educating the public in using the universal sign of choking should be encouraged. The universal choking sign is displayed by clutching the neck with both thumbs and fingers.

During choking, obstruction to airflow may be partial or complete. Partial airflow obstruction can be subdivided further into having good air exchange or poor air exchange. Partial obstruction with good air exchange can be recognized by the presence of a vigorous cough and sometimes wheezing. Patients with good air exchange should initially be left alone and allowed to cough out the offending object. Partial obstruction with poor air exchange is present when he or she has only a weak cough, stridor, or cyanosis. Partial obstruction with poor air exchange is a medical emergency demanding immediate action and should be treated as a complete obstruction.

When obstruction to airflow is complete, he or she is unable to cough or breathe. There is no air movement. The diagnosis can be confirmed by asking if he or she is choking. If choking is present, then he or she should be asked to speak. A lack of speech indicates that a complete airway obstruction is present and requires immediate action.

## EVIDENCE-BASED TREATMENT OF CHOKING

Unfortunately, the level of evidence guiding therapy for acute airway obstruction is weak. There are no randomized clinical trials, but this lack of evidence may be consistent with the relative rarity of the problem.

### *Controversy About Treatment*

One of the more interesting aspects of the medical treatment of choking has been the approach to changing treatment recommendations by those who favor abdomenominal thrusts as the primary method of treatment for choking. Traditionally, new medical therapy is introduced by providing convincing evidence of its efficacy and then using a variety of educational methods to promote the new treatment. This process takes years to implement and sometimes does not produce the desired change in physician behavior (10).

Henry Heimlich published his description of the abdominal thrust for the treatment of choking in the magazine *Emergency Medicine* in 1974 (11). In the article, he described the use of subdiaphragmatic pressure to relieve foreign body airway obstruction in four dogs. He had not tried the procedure on humans, but asked that those who did send him information about the results of their use of the technique. In 1975, Heimlich published the results of this request for information in the *Journal of the American Medical Association (JAMA [12])*. The *JAMA* article described 162 cases in which abdominal thrusts reportedly dislodged foreign objects obstructing the airway. The author encouraged others to use abdominal thrusts on choking victims.

Rather than publish additional research in peer-reviewed medical journals to convince other physicians to teach the procedure, Dr. Heimlich used the data from his case series to appeal directly to the public, discounting previous recommendations by the American Heart Association (AHA), the American Red Cross (ARC), and the American Academy of Pediatrics (13). In December 1978, Dr. Heimlich submitted a letter to the *New England Journal of Medicine* in which he defended the use of abdominal thrusts as the primary

technique for the treatment of choking (14). In 1979, Dr. Heimlich appealed directly to EMS professionals with an editorial entitled *Back Blows are Death Blows*. In the article he castigated professional organizations for not adopting abdominal thrusts as the primary treatment for choking (15).

Today, there is some physiological evidence to guide decision making. It is clear that abdominal thrusts have saved many lives among victims of choking. Questions remain about whether other techniques, such as chest compression, are as effective or possibly more effective.

One of the principal obstacles of determining effective treatment for acute airway obstruction is the anecdotal nature of the case reports. There is surely a positive reporting bias in which authors attribute success to the procedure used although unsuccessful attempts are ascribed to issues other than the technique such as the type and location of the foreign material or the inexperience of the rescuer. Additionally, the last technique tried before revival of the victim is likely to be given full credit for success, although perhaps a combination of different techniques was in fact responsible for removing the offending object.

Certainly, there is no shortage of medical interventions advocated as useful and desirable based on anecdotal evidence. One of the most famous of these was the practice of bleeding ill patients in an attempt to restore appropriate balance among the “four body humors.” One of the major medical journals, *Lancet*, is named for one of the tools of this practice, widespread at the time of the journal’s founding. Because of the lack of rigorous scientific support for any individual technique, it is important to keep an open mind about the subject of the effectiveness of all different techniques.

### CASE REPORTS

Most of the available evidence regarding treatment for choking is in the form of case reports. In 1975, Heimlich described 162 communications he received reporting successful application of the abdominal thrust technique to resolve choking (12). A wide variety of objects were expelled from victims including food, pills, and candy. Five of the reports described the use of the method on drowning victims, a use Heimlich did not anticipate. Two rib fractures were the only complications reported.

Others have reported on the results of different techniques for treatment of choking. In 1979, Dr. Ingalls, a survivor of a café coronary in 1973 (16), described how a well-timed slap on the back removed a piece of food from a physician attending a Board of Directors meeting of the Philadelphia County Medical Society (17). Dr. Richard Westfal reported on two patients who were found by paramedics to be cyanotic with complete airway obstructions as a result of food impaction that had not responded to repeated Heimlich maneuvers. In both cases, paramedics were successfully able to retrieve the offending food using Magill forceps with laryngoscopy (18). In 2002, Brown et al. reported on the use of 60% oxygen and 40% helium gas (Heliox) administration to temporarily ease the work of breathing in a 22-month-old child with partial airway obstruction as a result of the aspiration of a sunflower seed into the right mainstem bronchus (19). This technique might also be useful with partial obstruction of the trachea or pharynx.

### CADAVER STUDIES

The recently dead human body provides an excellent model of the unresponsive person with choking, although it may not be a good model of choking in the responsive person because the muscle tone in the pharynx, chest, and abdomen probably influence the

effectiveness of various methods to remove foreign material from the trachea and glottis. Twelve unsuccessfully resuscitated victims of out-of-hospital CA were studied in Oslo to determine whether chest compression or abdominal thrusts generated higher peak airway pressure (20). The investigators found that chest compression generated a peak airway pressure of  $40.8 \pm 16.4$ , which was significantly higher than the  $26.4 \pm 19.8$  cm H<sub>2</sub>O pressure generated with abdominal thrusts. In 2 of the 12 patients, no tracheal air pressure whatsoever was generated by abdominal thrusts. Dr. Heimlich responded with a letter to the editor of *Resuscitation* in which he promoted the use of the Heimlich maneuver over chest compression based on the duration and amount of airflow and not just the peak pressure generated (21). Additionally, Dr. Heimlich suggested that the term subdiaphragmatic pressure was a more accurate description than abdominal thrust of the method used. Dr. Steen and his colleagues (22) responded to Dr. Heimlich's analysis by pointing out that their study of chest compression was congruent with results obtained by Ruben and MacNaughton that chest compression was more effective than subdiaphragmatic pressure (23).

### MECHANICAL MODELS

Dr. Day and colleagues performed a series of experiments to measure the forces induced by back blows applied to young adult volunteers (24). Two adults had accelerometers taped to the anterior neck at the level of the thyroid cartilage. Vigorous blows, insufficient to cause pain or bruising, applied on the backs of the subjects developed acceleration forces ranging from 0.8 to 1.8 g. The accelerometer was moved to measure the upward force the range was 1.5 to 3.3 g. The authors pointed out that these forces might tend to propel an object above the vocal cords down into the trachea. Day et al. also performed experiments in which airflow was measured when the Heimlich maneuver was applied and compared those measurements with those taken when back blows were applied. Day et al. consistently found much higher airflow with the Heimlich maneuver. Others have found deficiencies in the design of the experiment and note that the accelerometer measurements were not conducted with the Heimlich maneuver (13). Better models need to be developed.

### LIVING MODELS

In his 1975 account of the abdominal thrust, Heimlich described an experiment involving four dogs (12). After receiving general anesthesia, the animals had raw hamburger inserted into the larynx until the airway was occluded totally. In each case, after one or two firm thrusts were made on the abdomen a short distance inferior to the rib cage, the bolus was expelled.

Heimlich briefly described the use of the abdominal thrust method on 10 healthy human volunteers and noted a peak expiratory flow rate of 205 L per minute with 940 mL of air expelled in one-fourth of a second (25). There are no other published human experiments.

## TECHNIQUE

### ABDOMINAL THRUSTS

Abdominal thrusts are performed using the following procedure. The rescuer stands behind the choking person and wraps his or her arms around the victim's waist. Making a fist with one hand, the rescuer places the thumb side of fist against the abdomen in the midline just above the umbilicus and well below the xiphoid process. The fist is grasped with the other hand and the rescuer quickly pulls inward and upward.

The procedure can be repeated several times until the object is expelled (26). Abdominal thrusts can be self-administered using one's hands or by forcefully bending over an object such as back of a chair or porch railing (27).

Abdominal thrusts may be performed on unresponsive choking victims by placing the victim supine on the floor. Then the rescuer straddles the victim and places one hand on the abdomen in the midline just above the umbilicus. The other hand is placed on top of the first, and firm inward and upward thrusts are applied.

### **CHEST THRUSTS**

Chest thrusts are performed when a female victim is pregnant or the victim is too large for the rescuer to get his or her arms around the abdomen. Again, the rescuer should stand behind the responsive victim and wrap his or her arms around the victim's chest just below the axillae. After making a fist, the rescuer places the thumb side of the fist against lower sternum while avoiding the xiphoid process and lower costal margin so as not to injure the abdominal organs. Then the fist is grasped with the other hand. Finally, the rescuer should pull hard in a repeated thrusting motion until the obstruction is relieved or consciousness is lost (26).

If the rescuer's arms are too short to encircle the chest or if the victim is unresponsive, the victim is placed supine on the floor; and the rescuer kneels close to the victim's side. Using a hand position similar to that used for chest compressions during CPR, the rescuer pushes hard on the chest to relieve the obstruction.

### **ADVANCED METHODS**

Properly trained rescuers can use more advanced techniques to remove or bypass the obstruction. Unfortunately, these will often not be helpful because most victims cannot be brought together with a well-trained rescuer within the short window of time before hypoxia causes irreversible brain injury or death. Both the Magill forceps and the Kelly clamp have been used to retrieve foreign bodies from the pharynx using direct vision (18). The object can be visualized using a laryngoscope or, in some cases, a tongue blade and a flashlight.

Emergency cricothyrotomy or tracheotomy can also be lifesaving. These surgical techniques require more skill than the use of the Magill forceps. Many paramedics are taught techniques for transtracheal administration of oxygen using a small catheter attached to a high-pressure jet ventilation valve. Use of high-pressure oxygen in the setting of a complete tracheal obstruction might result in expelling the object from the trachea. It might also lead to pneumothorax or pneumomediastinum. However, when the patient is in a high-risk situation in which all other techniques such as repeated abdominal thrusts and attempted removal of the foreign body using the direct visualization technique have failed to open the airway, doing nothing will certainly result in death. In such cases, the benefits of using high-pressure jet ventilation outweigh the risk and are justified.

### **MANAGEMENT RECOMMENDATIONS**

The AHA, in conjunction with international organizations, issued revised management guidelines for foreign body airway obstruction in 2000 (26). However, unlike most other domains of emergency management of resuscitation, there is not international agreement on the best methods for clearing a foreign body airway obstruction. For example, the AHA recommends the use of abdominal thrusts as the initial maneuver in responsive

adults although the European Resuscitation Council recommends five back blows or slaps initially (28). The back blows are given with the heel of the rescuer's hand between the victim's shoulder blades. In Australia, back blows with the patient in a lateral recumbent position are the first treatment followed by lateral chest thrusts. The Australian resuscitation organization recommends that abdominal thrusts be avoided as too dangerous and likely to injure internal organs.

#### **ADULT (AGE 8 OR OLDER)**

**Responsive.** If the victim is responsive, then the AHA guidelines recommend that abdominal thrusts be used until the airway is cleared as judged by the individual's ability to cough or speak or consciousness is lost (26).

**Unresponsive.** In the 2000 AHA guidelines, the lay-rescuer is not taught the complete skills for treatment of foreign body airway obstruction (26). Because the likelihood of encountering an unresponsive person whose problem is airway obstruction is small and the amount of time to teach skills is limited, the instruction time should be spent on more commonly used procedures such as reinforcing chest compression skills for unconscious victims of ventricular fibrillation. Should the victim become unresponsive, the lay rescuer is urged to activate EMS or send someone else to do it; and then begin standard CPR. The guidelines point out that the chest compressions of CPR may themselves dislodge the foreign body.

The 2000 guidelines recommend that health care providers who treat an unresponsive victim be taught additional skills (26). If the health care provider witnesses the victim's collapse and knows that the problem is foreign body airway obstruction, then the rescuer should activate the emergency response system and begin a systematic approach to restoring airflow. First, the rescuer is to perform a tongue–jaw lift, followed by a finger sweep to remove the offending object if present. Next, ventilation is attempted. If effective breaths cannot be given (determined by observing chest rise), then the Heimlich maneuver with the victim supine is recommended and may be repeated up to five times as needed. The cycle of jaw lift, finger sweep, attempt ventilation, and Heimlich maneuver is repeated until the airway is cleared or advanced equipment is available. When Magill forceps, Kelly clamp, or cricothyrotomy kit is available and the airway remains obstructed, then they should be used by persons properly trained in the techniques of removal of foreign bodies using direct visualization or surgical cricothyrotomy.

If the individual is found to be unresponsive, then the rescuer has to determine whether foreign body airway obstruction or primary CA or some other reason for the apparent unresponsiveness is present. Foreign body airway obstruction may be diagnosed when the rescuer follows the CPR sequence and attempts to ventilate an unresponsive person who is not breathing spontaneously and finds that the chest does not rise. The most likely cause is obstruction as a result of soft tissues in the pharynx. So the first treatment is to reposition the head and attempt ventilation again. If that does not work, then the Heimlich maneuver is tried up to five times with the individual supine. The same sequence of steps is followed as described in the section on the witnessed collapse of the choking victim.

#### **PREGNANT WOMEN OR VERY OBESE INDIVIDUALS**

The 2000 AHA guidelines recommend the use of chest thrusts on lieu of abdominal thrusts for pregnant women or the extremely obese when the rescuer's arms cannot encircle the individual's abdomen.



### CHILD (AGE 1–8)

**Responsive.** The 2000 AHA guidelines recommend repeated abdominal thrusts in the child 1 year of age or older until the airway is successfully opened, as judged by the ability of the child to cough or speak, or until consciousness is lost.

**Unresponsive.** When an unresponsive child with a suspected foreign body airway obstruction is found, the lay-rescuer is advised to perform standard CPR with one addition. The added step is to look for the obstructing object in the back of the pharynx each time the airway is opened. If the object is visible, the rescuer should remove it. This sequence of steps is intended to simplify the teaching of CPR, and the chest compressions provided during CPR may dislodge the foreign body.

When a health care provider encounters an unresponsive child between 1 and 8 years old with suspected foreign body airway obstruction, the 2000 AHA guidelines suggest first opening the airway and looking for the object (29). If the object is visible, it should be removed. Blind finger sweeps are not recommended. Then the airway is opened and rescue breathing attempted. If air does not make the chest rise, then the airway is repositioned and rescue breathing attempted a second time. If the chest still does not rise, then up to five abdominal thrusts are performed with the child in a supine position. The steps are repeated until the foreign object is removed, rescue breathing is effective, or signs of circulation are lost. If signs of circulation are lost, then standard CPR is begun.

Once advanced equipment is available, the removal of the foreign object using Magill forceps under direct vision provided by a laryngoscope can be attempted. As a last resort, an effort to perform an emergency tracheotomy can be made provided that the rescuer has been trained in the technique.

### INFANT

The 2000 AHA Guidelines recommend using a combination of back blows and chest thrusts to treat complete foreign body airway obstruction in a responsive infant less than 1 year old (29). The Heimlich maneuver is not recommended in this age group because of the relatively large and unprotected liver in the infant. The infant is held with the head lower than the trunk and the rescuer strikes the infant's back between the scapulae with the heel of the hand.

If the infant becomes unconscious, the lay-rescuer is advised to perform 1 minute of standard CPR in the hope that the chest compressions will dislodge the offending object. If the problem is not resolved after 1 minute in a single-rescuer situation, the rescuer should suspend efforts to resuscitate and contact the emergency response system. Then CPR is resumed.

If the rescuer is a health care provider who is treating an unresponsive infant with suspected foreign body airway obstruction, then the first step is to open the airway and attempt rescue breathing. If air is not moving, then the head is repositioned; and rescue breathing attempted again. If that does not work, then five back blows followed by five chest thrusts are administered. The airway is reopened and rescue breathing is attempted again. This sequence is repeated until the object is removed or up to about 1 minute. Then in the single-rescuer situation, the rescuer stops resuscitation and activates EMS. Following EMS activation, the rescuer should check for signs of circulation and begin chest compressions if necessary. If circulation is present, then the sequence of opening the airway, attempting breathing, administering back blows, administering chest thrusts, and rechecking the airway is continued until the foreign body is removed or signs of circulation are lost.

## COMPLICATIONS

All of the procedures used to treat acute airway obstruction may lead to complications. Perhaps the most important complication is delay in the use of effective treatment when hypoxia is present. However, because the most effective treatment is not known, it is challenging to measure incidence of this adverse event.

Back blows may lodge the foreign body more tightly in the trachea. As a result, Dr. Heimlich renamed back blows “death blows” (15). Dr. Heimlich wrote about a case in which a teenager who was choking on a sandwich and had a partial airway obstruction developed a complete obstruction after administration of back blows. In many cases in which back blows seemed harmful, it appears that the back blows were applied to victims with only partial airway obstruction (30). This serves to emphasize that there is no reason to apply any technique of artificial cough when victims can move air and cough, as a natural cough is many times more forceful than an artificial cough whether induced by back blow, Heimlich maneuver, or chest compression.

The use of the Heimlich maneuver has been associated with rupture of internal organs and laceration of viscera (31–34). Chest compressions are well known to cause rib and sternal fractures. Although usually benign, these fractures can lead to additional morbidity such as pneumonia or even death from respiratory insufficiency. Nonetheless, given the large number of people worldwide who have multiple chest compressions during CPR, it would appear that the incidence of serious complications following only a few chest compressions is very small and may in fact be less than that associated with the Heimlich maneuver (21).

In the past, rescue organizations such as the ARC and the AHA recommended the use of blind finger sweeps to attempt to remove foreign bodies. Given evidence that this technique may result in the further impaction of the object against the larynx as well as injury to the pharynx, the use of blind finger probing of the pharynx is to be avoided (35). It is probably reasonable to have victims undergo a medical evaluation to exclude complications after use of any abdominal thrust or chest compression to relieve choking.

## SUMMARY

There is little evidence with which to guide the best treatment of choking. A strong body of anecdotal evidence favors the use of subdiaphragmatic pressure, the Heimlich maneuver, as the first treatment in complete airway obstruction for most victims. Chest thrusts and back blows are helpful in some victims. A combination of procedures may be better than continued use of one procedure that has failed. Thus, the current AHA recommendations seem to be a reasonable guide to the practicing physician and the public, although not a guide based on strong evidence. Additional information is needed, and good epidemiological studies are desirable to identify ways to reduce the more than 3000 deaths that occur annually from choking in the United States.

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