

Vomiting as a Complication of the Heimlich Maneuver

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THE HEIMLICH maneuver has recently been adopted as the standard treatment for the obstructed airway in children, adolescents, and adults.¹ These same standards and guidelines caution that the Heimlich maneuver should only be used in near-drowning situations when the rescuer suspects that foreign matter is obstructing the airway or the victim does not respond appropriately to mouth-to-mouth ventilation. Heimlich and his colleagues²⁻⁵ have been calling for the maneuver to be the first line of treatment for near-drowning victims, to remove water from the lungs and airways. Others have argued that the routine performance of the maneuver without first demonstrating airway obstruction with foreign matter is a waste of valuable time and might produce complications.⁶⁻⁹

This case report describes a near-drowning victim whose first step of treatment with the Heimlich maneuver resulted in emesis with aspiration, which complicated what otherwise should have been a routine resuscitation.

Report of a Case

A 10-year-old boy with a known seizure disorder (complex partial and absence) was swimming in a chlorinated indoor swimming pool, with peers and a lifeguard in attendance. He was last seen swimming in the shallow end of the pool, approximately one to two minutes before the lifeguard saw him at the bottom of the deep end. No one had witnessed a seizure in the water. He was retrieved from the pool and, in the supine position with his head turned to the side, was given subdiaphragmatic abdominal thrusts (Heimlich maneuver), allegedly to drain water from the lungs. He vomited profusely after the Heimlich maneuver. A physician and the lifeguard then attempted to administer cardiopulmonary resuscitation, but the vomitus interfered with the adequacy of mouth-to-mouth resuscita-

tion. A rescue team arrived within five minutes and at the time of intubation noted copious vomitus in his oropharynx and trachea. The patient was initially apneic and asystolic, but sinus cardiac rhythm was obtained after intravenous administration of epinephrine.

Initial arterial blood gas values on admission to the intensive care unit while the patient was being ventilated with 1.0 fraction of inspired oxygen showed a pH of 6.98, arterial oxygen pressure of 133 mm Hg, arterial carbon dioxide pressure of 61 mm Hg, and bicarbonate radical of 14 mmol/L (14 mEq/L). The pH of his tracheal aspirate was 7.5, but looked and smelled like gastric contents. Neurologically he was unresponsive, with pupils midposition and fixed, negative cold-water calorics, and no response to suctioning or painful stimuli. Because of the poor neurologic function, he was treated with standard cerebral resuscitation measures.

His intensive care course was complicated by adult respiratory distress syndrome with pneumomediastinum, and right and left pneumothoraces, poorly compliant lungs, and high levels of positive end-expiratory pressure required to maintain oxygenation. He developed *Serratia marcescens* pneumonia, complicated by bacteremia. After a stormy three-week course, he was finally discharged from the intensive care unit in a persistent vegetative state with severe anoxic encephalopathy. He remained in a vegetative state in a nursing home until his death seven years later.

Comment

Despite prognostic scores that would have predicted a 90% probability of a recovery with, at most, mild neurologic sequelae (aged >3 years, maximum submersion for <5 minutes, resuscitation within ten minutes of accident but coma on admission, and initial pH <7.10),¹⁰ the patient's neurologic function on admission to the intensive care unit was very poor and portended a grave neurologic prognosis.^{11,12} Cerebral resuscitation measures were em-

ployed because of the apparent severe anoxic cerebral insult.¹² The vomiting that occurred after the Heimlich maneuver not only complicated immediate resuscitation and oxygenation, but created a postresuscitation complication of gastric aspiration pneumonitis. The failure to adequately ventilate and oxygenate in the initial stages of resuscitation resulted in a severe and permanent neurologic impairment from anoxic encephalopathy.

The Heimlich maneuver is effective for individuals choking on food and foreign-body airway obstruction where the victim can neither cough, speak, nor breathe. The Heimlich maneuver has recently been accepted as the recommended treatment for relieving foreign-body airway obstruction in children and adults by the American Heart Association and the American Red Cross.¹

In addition to its use for foreign-body airway obstruction, Heimlich and colleagues²⁻⁵ recommend the use of this maneuver as first-line therapy for all near-drowning victims, even before mouth-to-mouth ventilation. Heimlich has stated that "85% of drowning victims die from asphyxia due to blockage of the airway by aspirated water."^{4,5} These statements contradict a large body of clinical and experimental evidence.¹³⁻¹⁵ In freshwater drownings, the water is rapidly absorbed from the lungs into the circulation. In seawater drownings, the hypertonic salt water will draw fluid from the circulation into the lungs, but this fluid is pulmonary edema fluid and includes proteinaceous fluid from alveolar injury. In fact, non-cardiogenic pulmonary edema from alveolitis occurs in both freshwater and saltwater aspiration and is more likely to interfere with adequate ventilation than the aspirated water. Experimental studies have demonstrated that it is not difficult to oxygenate and ventilate through aspirated fresh or salt water.^{16,17} The major problems with oxygenation and ventilation occur remotely when alveolar injury and surfactant destruction from aspirated water create an adult respiratory distress syndrome picture.

Actual foreign-body obstruction of

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the airway in submersion accidents has not been demonstrated to any significant extent in clinical or pathologic studies.^{18,19} There are suggestions in the literature that upper airway obstruction after a submersion accident may be due to laryngospasm and not foreign bodies or water.²⁰ There are no data indicating that the Heimlich maneuver can alleviate laryngospasm.

The risks of the Heimlich maneuver in submersion accident victims may be substantial. It is known that these victims frequently swallow large amounts of water,^{9,13,19,21} and subdiaphragmatic or epigastric thrusts are likely to produce vomiting.⁶ As demonstrated in this case report, not only can the emesis interfere technically and aesthetically with rescue breathing, but it can also compound and worsen the pulmonary injury by causing a gastric aspiration pneumonitis. It is possible that the child in this case would have vomited anyway, since approximately 24% of human drowning victims have been reported to have aspirated vomitus,¹⁹ but the temporal relationship to the Heimlich maneuver in this case report is clear. How many victims vomit because of a purposeful or an inadvertent Heimlich maneuver is unknown.

In the near-drowning victim who begins to vomit, methods to protect the victim from aspiration, including lateral, head-down positioning and possibly cricoid pressure, should be em-

ployed.²² Endotracheal intubation and decompression via a nasogastric tube may reduce the risk of gastric aspiration pneumonitis.

It appears that the Heimlich maneuver should not be the first step in rescuing a submersion accident victim. Not only does it unnecessarily delay the critically important step of ventilating the apneic victim, but it may predispose to vomiting and the complication of gastric aspiration pneumonitis. Emesis would also further delay and interfere with effective rescue breathing. Since the most critical step in the successful resuscitation of submersion accident victims is establishment of effective ventilation at the earliest opportunity, any maneuvers that delay or complicate this goal should be avoided.

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Reversal of Chronic Polymyositis Following Intravenous Immune Serum Globulin Therapy

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POLYMYOSITIS is an inflammatory disease of striated muscle, which has been attributed to a vasculopathy. Although the pathogenesis is unknown, studies suggest that an immune mecha-

nism may contribute to this disorder. The evidence consists of the presence of tissue-bound immunoglobulins and complement within blood vessels of involved muscle¹ and the in vitro cytotoxic effect of patients' lymphocytes on muscle cells grown in culture.^{2,3}

The mainstay of therapy in polymyositis is corticosteroids. This treatment results in improvement of prognosis and life-style in most patients with this disorder.⁴⁻¹⁰ However, some individuals are refractory to steroid therapy or demonstrate only a partial response.^{11,12} In other patients, short- or long-term

toxic reactions to corticosteroids force discontinuation of the drug. Such patients who are resistant to or intolerant of corticosteroids have been treated with immunosuppressive agents, including methotrexate sodium,¹³⁻¹⁷ azathioprine sodium,¹⁸⁻²⁰ cyclophosphamide,^{17,21,22} and cyclosporine.²³

Although patients may benefit from immunosuppressive therapy, up to 50% of patients with polymyositis may persist with active disease despite combination therapy.²² We herein describe the dramatic response to intravenous (IV) immune serum globulin therapy in a

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