imagine that air can pass without difficulty through a trachea and bronchi full of water, and in this condition the air pushes the water toward the lungs, impairing gas exchange. In results from experiments on sheep, the introduction of 1 to 3 mL of water per kilogram of body weight is sufficient to cause a “precipitous fall and a prolonged depression of arterial oxygen saturation.”⁵ In dog experiments, the survival rate was inversely proportional to the quantity of fluid aspirated⁶ and “the clinical picture is determined predominantly by the amount of water that has been aspirated.”⁷ There is consensus that introduction of air into the lungs through mouth-to-mouth or other methods of resuscitation leads to effective oxygenation.^{1,2} This means that at least part of the alveoli are functioning because they were not previously filled with water or that the air blown can at least partially restore alveolar function. It seems logical that pushing more water into the trachea or bronchi toward the alveoli that have remained healthy can damage them, and pushing more water toward the damaged alveoli can accentuate their dysfunction. Therefore, a rapid elimination of water from the airways should be useful.

SAFETY OF THE UPSIDE-DOWN MANEUVER

Overturning upside down is a playful maneuver that some parents do with their children. In a child without bone lesions, it is surely safe. However, even in the condition sometimes present in a drowning child, that is, a cervical fracture, a maneuver that is not carried out abruptly probably does not involve greater risks than the other movements the rescue involves, considering the weight of the head down carries out a traction that can extend and straighten the column.

Putting a child upside down delays mouth-to-mouth breathing for a few seconds, a delay that is probably irrelevant. It is a nontraumatic operation, aiming to eliminate as much liquid as possible from the airways. The upside-down maneuver could be considered an alternative to the abdominal thrust (Heimlich maneuver),⁴ which is not recommended, as clearly expressed in guidelines,^{1,2} both for the time it requires and for its roughness and possible adverse effects such as vomiting and gastric acid aspiration; it is certainly much less effective than using the simple force of gravity.

Obviously, the upside-down maneuver can be implemented appropriately in relation to the weight and size of the child, which may be greater if more than 1 operator is providing assistance.

Carlo Cianchetti, MD

Universita degli Studi di Cagliari Facolta di
Medicina e Chirurgia, Cagliari, Italy
Email address: cianchet@unica.it

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In Reply to Dr Cianchetti

To the Editor:

We thank Dr Cianchetti for his inquiry and interest in drowning resuscitation.¹ The method he describes is, in fact, one of the original forms of drowning resuscitation, dating back to the ancient Egyptians. Depictions of this method can be found in stone carvings in the Pylon of the Ramesseum, dated to 1237 BCE. In this piece, the Great of Aleppo is being held upside down in an effort to drain water from his lungs after a drowning.² In the time since this carving, our understanding and treatment of drowning have improved, especially with the development of modern cardiopulmonary resuscitation, but ancient methods such as these persist. It does not take much effort to find modern videos of lay-rescuers and professional rescuers holding drowned children and adults upside down as an initial resuscitative technique.

Now is the point in the letter where I should direct readers to the evidence disproving such a method, but unfortunately there is little. Because this is a method that cannot be ethically studied, and given the overall paucity of data on the effectiveness of traditional (and even modern) methods following a drowning, we are primarily left with assumptions and expert opinion based on our understanding of drowning physiology. We know that hypoxemia is the primary cause of morbidity and mortality in drowning.³ We also know that the duration of hypoxemia correlates with neurologic outcome and mortality. For these reasons, any maneuvers or actions that delay the reversal of this hypoxemia may increase the risk of worsening neurologic damage and mortality.⁴ This is why methods such as

abdominal thrusts (Heimlich maneuver), which were at one time recommended for the initial resuscitation of drowning patients, are currently discouraged.⁵

As you alluded to, the evidence concerning the actual volume and effect of water aspiration are murky at best; additionally, many of the studies done in animals have used forced aspiration of large volumes, which may not be applicable to humans. The prevalence of laryngospasm, as well as differences in fluid shifts due to water salinity, are also not well understood. Most importantly, considering real-world education and treatment application, we believe that focusing on these minute details may cause a responder to miss the forest for the trees—or, in this case, the ocean for the waves. Given the effect of hypoxemia duration on patient outcome, it makes sense that the initial treatments can have the greatest effect on outcome. For this reason, we advocate strongly for focusing primarily on the initiation of positive pressure ventilations in patients not breathing adequately after a drowning.⁶ We strongly advocate for avoiding maneuvers and treatments that may take the focus away from initiating these ventilations, such as abdominal thrusts, continuous suctioning, and spinal “immobilization.” If initial attempts at ventilation are unsuccessful, maneuvers to clear the airway may be initiated with the goal of reattempting ventilations as soon as possible.

In Dr. Cianchetti’s letter, he is not wrong in stating that “Putting a child upside down delays mouth-to-mouth breathing for a few seconds, a delay that is probably irrelevant.” In discussions on drowning resuscitation, we scratch and claw at these seconds, much like stroke and cardiac arrest scientists; however, those of us who deal with all of these diseases know “a few seconds” probably is not, in fact, the division between life and death. What does divide life from death in these diseases is the presence of a provider who has a sound understanding of the presenting pathophysiology and well-practiced skill. We believe firmly that the only way to optimize treatment on a global scale is to keep the message simple and clear: Minimize time to the reversal of hypoxemia. By advocating for maneuvers and treatments that delay time to ventilation, we run the risk of adding to the numerous other misguided use of “seconds” that are often encountered during a resuscitation. In the end, these can add up to have a profound effect on the clarity of the message and, most importantly, on patient outcome.

Andrew Schmidt, DO, MPH
University of Florida, Jacksonville
Lifeguards Without Borders
Jacksonville, FL

Justin Sempsrott, MD
Lifeguards Without Borders
Jacksonville, FL

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Climbing Gyms as Possible High-Risk Transmission Locations in Microbial Outbreaks

To the Editor:

The popularity of indoor climbing has increased in recent years. Although high-quality data are not available, market research suggests that 1.5 million people now climb indoors in the United Kingdom every year, with this number increasing 15 to 20% each year (unpublished report commissioned by the Association of British Climbing Walls, 2019). This is in parallel with the rising public profile of climbing epitomized by the Oscar-winning documentary “Free Solo” and the inclusion of climbing in the 2020 Summer Olympic Games.

We would like to highlight the potential of climbing gyms as important locations for the transmission of microbes, including severe acute respiratory syndrome coronavirus (SARS-CoV-2). This is particularly relevant given its recent spread to North America, Japan, and Europe, where indoor climbing is popular.

Indoor climbing involves ascending/traversing walls using artificial holds. During a typical climbing session, a climber touches hundreds of holds with both hands. These same holds are shared with everyone else in the gym and, from our experience, are only cleaned every few months when routes are changed. Anecdotally, we observe that very few climbers wash their hands during sessions, and not all climbers wash their hands after sessions. Sharing holds in this way seems an opportunity for the transmission of bacteria and viruses transmitted by airborne, fecal-oral, and droplet routes via contaminated fomites and high population densities.