

The “Best” way to breath

Abstract

A “best” way to breath is described resulting from discovering a pre-Heimlich method of preventing choking. Because of four episodes in three months of terrifying complete laryngospasm, the physician-patient-writer, consistent with many medical discoveries in history, discovered a method of aborting the episodes. Breathing has always been taken for granted as spontaneously and naturally most efficient. To the contrary, nasal breathing is best with first closing the mouth which enhances oxygenation and trans-laryngeal respiration. Physiologic aspects are reviewed including nasal and oral respiratory distinctions, laryngeal musculature and structures, diaphragm control and neuro-functional speculations. Proposed is the SAM: Shut your mouth, Air in nose, and then Mouth cough (or exhale). Benefits include prevention of choking making the Heimlich unnecessary; more efficient clearing of the throat and coughs; improving oxygenation at molecular level of likely benefit for pre-cardiac or pre-stroke anoxic crises; improving exertion endurance; and offering a psycho physiologic method for emotional crises as panics, rages, and obsessive-compulsive impulses. This is a simple universal public health technique needing universal promulgation for the integration of care for all work forces and everyone else. Most do it naturally when not needed. However in dyspnea, the method does not come naturally and must be learned. Oral breathing is to be discouraged.

Keywords: breathing, choking, coughing, throat clearing, oxygenation

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Case report

During a three month interval, I had four episodes of complete obstructive choking phenomena-laryngospasm associated with small particulate irritation of my larynx such that I could not breathe. Each time was terrifying. Each was characterized by intense flushing of the face, diaphoresis, rapid heart rate and frantically moving into positions which might move air somehow anyway. I pushed my fist into the abdomen below my sternum hoping the pressure would open the vocal chords ala’ the Heimlich¹ even though there was no foreign body. I could not talk. Twice, I chewed an antihistamine because they were handy; they were not helpful. Twice was in a kitchen, and I pulled a small sharp cutting knife to try to do a cricothyrotomy on myself if I did not clear by my stridulous gasping to breath. In panic, I considered using my EpiPen, but did not. Each episode resolved after several minutes of intense struggling to breathe, both in and out, but it seemed like an eternity each time-to me and the 911 operator listening on the open phone which I had dialled in the panic-Once I was able to talk, she cancelled the ambulance and police in transit.

Totally at a loss, I consulted three ENT specialists who all told me the same thing: that should I faint because of this, the vocal chords would spontaneously open and I would not die.² None offered any advice on what I could do. The reassurance was not very reassuring. They sympathized that I was now sensitized to have this reaction and I should try to prevent any sort of particulate stimulating inhalation. Perhaps aging has something to do with my new sensitivity.³

Subsequent to the four episodes of full laryngeal obstruction, I had four incipient identical onset laryngospasm each due to food particles, but I was able to terminate them by inhaling through my nose and then coughing which cleared the triggering stimuli. The first time was clearly fortuitous. I had again started to choke on something with the laryngospasm beginning. But instead of trying to force ventilation through my mouth as I had always done before, I controlled my panic,

shut my mouth, and inhaled through my nose. It was not easy to do because the natural impulse is to open the mouth and gulp for air. It was a feeble “through a straw” nasal inhalation but at least air was moving! And to my surprise, I was able to inhale enough through my nose to be able to then expel air coughing away the stimulating material out of my larynx and mouth. I had to do the nasal inhaling and coughing routine several times, but air was moving easier in contrast to the other times. Without the desperate contortions, I was breathing normally. I was startled at how easy it was but uncertain if it would work again. It did on three other occasions. Each time I felt the panicky spectre of full laryngospasm just beginning, but by inhaling through my nose and coughing, I was able to terminate easily the full closure laryngospasm. Understated, this was a welcome discovery, which I practiced and used repeatedly.

During that winter, I had an unusual onset of laryngospasm: Having to walk home after dropping off my car at the local service station, I was breathing cold air (it was below freezing). After 5minutes, I realized that the laryngospasm and choking sensation were beginning to occur. I noted I was inhaling primarily through my mouth. Ignoring the ENT reassurances from before, I thought ominously, “Oh my God, not out here...they will find me when the snow melts...now what?” Because of previous experiences, I immediately shifted to conscious mouth shut nasal inhaling. The incipient laryngospasm subsided. I nasally breathed, mouth closed, comfortably the rest of the way to my home.

I concluded that if one had a sensitive larynx (from whatever cause: particulate, irritative, cold or obstructed), a mechanism of nasal inhaling could be therapeutic. My findings were reported in “The Doctors For Preparedness Newsletter, March, 2001.⁴ Many letters and calls were received from physicians and patients, including a 70year old woman grateful for my method which gave relief of 20years of similar laryngospasm for which she never obtained effective help. Dr. Thomas A Coppinger, M.D. of Kansas City, Missouri, among many

others, attested to the effectiveness of the method. He suggested an acronym of MSNBC: “Mouth Shut, Nose Blow, and Cough” to assist in remembering and teaching the procedure. Not liking television, I naturally thought of the SAM: “Shut mouth; Air in through nose; Mouth cough.” My well taught family members all describe effective “rescue” of choking individuals on a sporadic basis with the relieved person always saying, “Thank you... That really worked.” Fortuitously using this technique for a choking elderly man in a Home Depot recently, I decided to republish this discovery, feeling many others may benefit.

Physiology

Paroxysmal laryngospasm is described in Otorhinolaryngology-Head and Neck Surgery⁵ as an uncommon complaint usually related to gastroesophageal reflux. It was obvious in my case that the airway defense reflex does not need foreign bodies to be triggered. Special mechanical and chemical receptors have been described in the glottis surface highest in the arytenoids and contiguous regions.⁶

The physiologic laryngospasm response I experienced is clearly designed to prevent aspiration into the trachea. This is one of the three functions of the larynx: to protect the lower airway, the other two functions being respiration and phonation. The muscles of the larynx⁷ seem well designed to shut down any threat of intrusion into the lower airway. The preservation of an open airway by preventing aspiration is accomplished by the upper laryngeal muscles, especially the epiglottis, thyroepiglottic and thyroarytenoid muscles, all of which constrict the laryngeal inlet by pulling the arytenoids cartilage up and forward against the epiglottis. The lower intrinsic muscles of the larynx primarily control phonation by modifying tension on vocal folds accompanying sound, but they also modify the size of the glottigeal opening by altering length and tension on the vocal chords. This laryngeal sphincter guard is maintained by all internal muscles of the larynx except the posterior cricoarytenoid muscle. Classically, the posterior cricoarytenoids were considered the only abductors of the vocal folds for inspiration, however, some believe the lateral cricoarytenoids are also involved.⁸ All other internal laryngeal muscles are undeniably adductive sphincter effectors or for vocalization with the posterior cricoarytenoid muscle providing adductive opening or opposing tension and precision on the vocal chords when tightened by all the other muscles in phonation.

Of interest was the inability to move the diaphragm with full laryngeal closure. The most I could do was mechanical pressure of abdominal, inter costal and shoulder muscles, trying to force breathing, but, regardless, the diaphragm would not move. This seems to be a reflex paralysis of the diaphragm not to constrict unless the vocal chords and airway are open to some degree. Evidence exists for nasal sensations effecting cardiopulmonary reflexes in dogs.⁹ Neural pathways are discernible for comparable reflexes in humans.^{10,11} Basically, nasal breathing is mainly diaphragmatic while oral breathing mainly uses the more oxygen consuming chest muscles.

Research in dogs¹² confirms that nasal breathing has a differential impact from oral breathing. Proved was that air pressure changes in the nasal passages stimulated the posterior cricoarytenoid muscle. Maximal nasal ventilation gave maximal posterior cricoarytenoid abduction. In addition, with the change to mouth breathing, posterior cricoarytenoid activity decreased markedly. With tracheostomy, cricoarytenoid abductor activity completely ceases within minutes to return when the tracheostomy was occluded with return to upper

airway nasal ventilation. All this is clearly compatible with my experience that nasal inhalation opens the airway.

By nasal inhalation, I noticed a graduated increasing passage of air into the trachea in marked contrast to my gasping oral inhalations. The strange design of the paired cuneiform, corniculate, and arytenoids cartilages suddenly makes sense as a structure for sequential “testing” of inspiration as each paired cartilage delicately separates and opens from top downward like a series of sliding storm shutters (The posterior cricoarytenoid muscles gradually abduct even when all the other laryngeal muscles are constricted into guarding sphincters preventing aspiration). While the larynx is shut down to protect from aspiration, the slight mobility and potential for an opening between these paired cartilage processes would seem to be a natural process to test for safety. Also maintained is the potential for delicate sequential airway opening, otherwise laryngeal opening or closure would be a dangerous all or none phenomenon.

Reflections

- i. Anyone can compare nasal breathing with oral breathing. One will notice that nasal breathing is easier, quieter, requires less depth, and one is more relaxed and usually more unaware of nasal breathing. Shutting ones mouth facilitates all aspects of nasal breathing; in fact, it is difficult to breath nasally with the mouth open. In contrast, oral breathing is more muscular, noisier, requires a greater effort and one is typically more aware of it. Even without obstruction, the mechanisms seem noticeably different. One can readily sense the use of chest muscles with oral breathing.
- ii. One is better off not inhaling orally when eating or chewing food. Nasal breathing is the safe way. A moment’s reflection on swallowing and chewing in synchronization with breathing gives clear awareness of the delicate neuro-functional balance necessary to prevent eating from being a dangerous aspiration event. Eating contests should be prohibited.
- iii. Oral breathing has potential for airway obstruction in contrast to nasal breathing. There are reflexes available with oral breathing which shuts the system down to prevent aspiration of foreign bodies. On the other hand, there appears to be a nasal laryngotracheal shunt (through the arytenoids “storm shutter” mentioned effect) likely available to a certain point of obstructive foreign body size as long as one is still in an incomplete aspiration state. When one considers almost all potential aspirations are from the oral cavity, it is not surprising that a mechanism would exist to shut down with an oral threat but still have a potential for inhalation nasally as survival mechanism.
- iv. Procedures for establishing an airway during upper airway obstruction have not mentioned the benefits of nasal inhalation and the dangers of oral inhalation. Procedures have included neck extension, jaw lift, tongue pulled forward, finger sweep of oral pharynx, epiglottis and glottis, and the Heimlich Maneuver¹³ For early airway obstruction and the proposed Nigro-SAM Method should be the first recommendation.
- v. Modified for athletes and those “sport breathing,” Step 3 should be Mouth exhale rather than “Mouth cough.” This SAM modification enables an increase in deep breathing respiratory efficiency which further improves oxygenation for those in athletic events. It may be that nasal exhaling is just as good. The key is to shut one’s mouth to improve nasal inhaling.

- vi. The Heimlich Maneuver would have probably forced open my fully closed larynx. However, knowing there was no foreign body to expel, I did not consider the Heimlich, and no one was there any way to do it. Indeed, the Heimlich can be painful and even injurious to the victim with deaths having been reported. The Heimlich is to be used “for genuine emergencies to remove an object from the airway of a person who is choking”. Technically, without a foreign body, the Heimlich should not to be used. However, if the mechanism I have discovered does not work, the Heimlich should be used. Actually, this did happen to me at a family gathering and my son did the Heimlich on me which did work when my maneuver did not. But after the Heimlich has been used effectively, the Nigro Method should be used to further clear one’s throat. Mouth inhaling after the Heimlich is contraindicated.
- vii. Instead of “mouth to mouth” resuscitation (in ill repute anyway), “mouth to nose” resuscitation needs to be considered. It may offer a more direct and easier access to opening the airways and ventilating the lungs than heretofore recognized. Indeed, mouth to nose resuscitation has been recommended for children under 2 months of age.¹⁴ Others have firmly recommended the “nasal route of air entry be taught to parents of babies who have stopped breathing.¹⁵”
- viii. The Nigro-SAM Method (modified step 3 to mouth exhaling) may be of some help in weaning off ventilation support systems in intensive care and other medical/surgical settings. An informal review of the pulmonary staff and those responsible for assisting in weaning off ventilation systems was undertaken. Of some nine nursing individuals asked, none offered detailed instructions on breathing to patients in post operative and intensive care units. All provided information and a description of what they were doing with the procedure, but no one gave instructions on a proper way to breathe through the nose. It is possible that inhaling through the nose may assist, particularly if it involves reestablishment of function of the posterior cricoarytenoid muscle opening the larynx. Indeed, to make hospital rounds and see patients breathing through their mouth without instructions on nasal inhaling has become disturbing.
- ix. Nasal inhalation must be emphasized as part of routine personal hygiene.^{16,17} Nasal inhalation, enhanced by a shut mouth, is more healthy overall, less dangerous when eating and talking, and can be therapeutic when choking. It may a recommended way to try to breath when falling asleep; snoring will likely be reduced also.
- x. This maneuver must become part of elementary first aid. In fact, the Nigro-SAM and the Heimlich need to be promulgated by informational signs and on inside front covers of all public event programs. The death of a young woman in a major city ballpark in 2013 due to choking justifies this. The paradigm to present from childhood is: If you are having trouble breathing or need to cough or clear your throat, first always shut your mouth and then breathe in through your nose. Do it over and over. Remember, the SAM: Shut your mouth. Air in your nose. Mouth cough. If that does not work, do the Heimlich.
- xi. The psychological impact of “best breathing” by shut-mouth/na-
- sal- inhaling (SAM) is of no small importance. It increases self-awareness and introspection. If known about and practiced, it can stop anxiety, panic, temper, and rage reactions by distracting to self-control and improved oxygenation--just teach and shout “SAM and think it through!”

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Conflict of interest

The author declares no conflict of interest.

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