Dealing with cases of hiccups

In this article, Christine Clark gives a general overview of hiccups and the rarer condition of intractable hiccups.

Although almost everyone has experienced hiccups, little is known about their cause or significance. In contrast to reflexes such as coughing and sneezing, hiccups do not appear to have a useful function. Some scientists suggest that the mechanism is a remnant of our evolution from amphibians.

The term “hiccup” is thought to be derived from the sound of the event. The medical term is “singultus.” Episodes range from transient minor attacks to protracted bouts that can continue for days or weeks. The longest recorded bout of hiccups lasted for 60 years. Hiccups can occur at any age. Fetuses hiccup in utero and this has given rise to the hypothesis that the hiccup reflex circuitry might be important in the development of a sucking reflex — the sequence of movements during suckling is similar to hiccuping, with the glottis closing to prevent milk entering the lungs.

**Mechanism**

Physiologically, hiccups are forceful contractions of the inspiratory muscles produced by ascending, unpredictable contractions of the diaphragm. They involve involuntary lowering of the diaphragm and closure of the glottis and this produces the characteristic sound of breath is drawn. The glottis closes 35 milliseconds after electrical activity in the diaphragm and intercostal muscles rise, preventing further inspiration. Hiccups are associated with irritation of the phrenic nerves (see Panel 1, p648).

Observations have shown that hiccups follow a pattern in any individual. They will occur between four and 60 times per minute. The frequency remains relatively constant for that individual and is inversely related to arterial partial pressure of carbon dioxide (pCO2). Increasing pCO2 can reduce hiccup frequency.

**Reflex arc**

A hiccup reflex arc has been described. The afferent limb of the arc (carrying impulses to the central nervous system [CNS]) is composed of the vagus and phrenic nerves and parts of the sympathetic nervous system arising from thoracic segments (T6–T12). The “hiccup centre” is located in the upper spinal cord (cervical spinal cord nerves C3–C5). The efferent limb (carrying impulses from the CNS to the target organs) of the reflex is primarily the phrenic nerve with involvement of the nerves to the glottis and accessory muscles of respiration.

**Intractable hiccups** Most cases of hiccups resolve spontaneously. Episodes of long duration are described as “protracted,” “persistent,” or “chronic” if they last for more than 48 hours. Hiccups lasting for more than one month are described as “intractable.” Protracted or intractable hiccups are usually associated with an underlying disease and should be investigated. Although hiccups occur equally commonly in men and women, protracted and intractable hiccups are seen more commonly in men.

Prolonged or severe attacks of hiccups have been associated with significant morbidity. They are exhausting and extremely distressing. Prolonged hiccups disturb eating, drinking and sleeping resulting in weight loss, malnutrition and exhaustion. Wound dehiscence and death have also been reported.

The underlying causes of persistent or intractable hiccups are a heterogeneous collection of conditions that stimulate the nerves involved in the hiccup reflex. Such stimulation can be due to a range of causes: structural (eg, diaphragmatic irritation caused by pericarditis or subphrenic abscess); metabolic (eg, uraemia or hypokalaemia); toxic (eg, acute alcoholism); inflammatory (eg, appendicitis, cholecystitis, or inflammatory bowel disease); demyelinating (eg, multiple sclerosis); neoplastic (eg, central nervous system or gastro-oesophageal tumours); or infectious (eg, chest infections).

Some drugs, including benzodiazepines, methyldopa and antibiotics, have been linked to the onset of hiccups. There are also various reports of hiccups occurring secondary to corticosteroid therapy (especially at high-doses). It has been suggested that corticosteroids allow hiccups to occur by lowering the synaptic threshold in the brainstem.

In addition, hiccups are listed as a side effect for buprenorphine, nicotine replacement therapy, ondansetron and aperitif.

**Treatment of hiccups**

Hiccups have been known since ancient times. In Plato’s ‘Symposium’, Erichmarchus the physician advises Aristophanes: “... hold your breath, and if after you have done so for some time the hiccup is no better, then gargle with a little water, and if it still continues, tickle your nose with something and sneeze, and if you sneeze once or twice, even the most violent hiccup is sure to go.” In fact,
_{Panel 1: Glossary}_

**Carotid sinus** The carotid sinus is a widening of the wall of each carotid artery (two carotid arteries run up either side of the front of the neck) that contains baroreceptors.

**Glottis** The glottis is the space between the vocal cords.

**Pharynx** The pharynx is the space at the back of the mouth that leads to the digestive tract and the respiratory tract.

**Phrenic nerves** The phrenic nerves are the two major nerves that supply the diaphragm. Arising from the third, fourth and fifth cervical spinal nerves (C3, C4 and C5), they pass through the chest and each phrenic nerve supplies one side of the diaphragm, the main muscle used in breathing. The phrenic nerves, therefore, control breathing. They also provide sensory innervation for many components of the mediastinum, pleura and the upper abdomen (eg, the liver). Pain arising from structures served by the phrenic nerve is often referred to other somatic regions served by spinal nerves C3–C5. For example, the pain of angina pectoris is classically felt in the chest and down the left arm.

most hiccups will stop spontaneously and rarely require treatment.

Evidence from controlled trials for the treatment of hiccups is lacking and guidance is generally based on evidence from case studies or anecdotal reports. A variety of measures appear to be successful including physical manoeuvres, drug treatment, acupuncture, electrical stimulation and nerve blocks. Many of the measures that have passed into popular folklore do have a sound physiological basis.

Panel 2: Self help methods for hiccups

- Sip iced water
- Swallow granulated sugar
- Bite on a lemon
- Hold your breath, hyperventilate or breathe into a paper bag.
- Get someone to give you a sudden fright, causing you to gasp.
- Pull your knees to your chest.

The World Health Organization has made recommendations for drug treatment of intractable hiccups in cases of terminal illness. 

**Alternative therapies** Acupuncture and hypnotherapy might be effective in some cases and electrical stimulation or surgical or chemical disruption of the phrenic nerve may be considered for hiccups that fail to respond to drug treatment and that cause significant discomfort.

**1977 protocol** Despite the paucity of evidence for intractable hiccup treatments, a treatment protocol was suggested by Williamson and Macintyre in 1977.

This proposes several treatment steps, starting with correcting any metabolic abnormalities and administering granulated sugar and ending with phrenic nerve crush.

References


Resources