

## Treatment of Idiopathic Persistent Hiccups with Positive Pressure Ventilation -A Case Report-

Department of Anesthesiology and Pain Medicine, School of Medicine, Kyungpook National University,  
\*School of Dentistry, Kyungpook National University, Daegu, Korea

Sung Hye Byun, MD, and Young Hoon Jeon, MD\*

A 41-year-old male patient presented with idiopathic persistent hiccups. The hiccups did not respond to pharmacologic treatments including cisapride, omeprazole, and baclofen. Phrenic nerve block was also ineffective. However, the persistent hiccups were successfully treated with short-term positive pressure ventilation using a short-acting muscle relaxant. (Korean J Pain 2012; 25: 105-107)

### Key Words:

hiccups, positive pressure ventilation.

Hiccups are an involuntary powerful spasm of the diaphragm, followed by sudden inspiration with closure of the glottis [1]. Transient hiccups are common, and subside spontaneously or respond to simple management. However, persistent hiccups that last over 48 hours lead to a number of complications, such as dehydration, fatigue, insomnia, gastroesophageal reflux, arrhythmia, and even death [2,3]. We report a case of a patient with persistent hiccups who did not respond to medical treatment or phrenic nerve block. The hiccups were successfully treated with short-term positive pressure ventilation using a short-acting muscle relaxant.

### CASE REPORT

A 41-year-old male patient with persistent hiccups that started suddenly and lasted for 10 days was referred to our department. His past medical history was unremarkable. The patient had no history of repeated hiccupping episodes. Chest X-ray, abdominal ultrasound, gastroscopy, and electrolyte analysis showed no abnormalities. General neurological and otorhinolaryngological examinations also showed no abnormal findings, except for hiccups with a frequency of 15-20 per minute, which continued during the patient's sleep. The hiccups did not respond to conservative treatment methods, such as drinking cold

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Correspondence to: Young Hoon Jeon, MD

Department of Anesthesiology and Pain Medicine, School of Dentistry, Kyungpook National University, 130, Dongdukro, Jung-gu, Daegu 700-421, Korea

Tel: +82-53-420-5871, Fax: +82-53-426-2760, E-mail: jeon68@knu.ac.kr

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water, breath holding, and pharynx stimulation. Cisapride 30 mg, omeprazole 40 mg, and baclofen 30 mg were administered daily for 9 days, but these medications had no effect. Gabapentine 300 mg daily was added, but the patient suffered from dizziness and refused the medication. The patient's hiccup contractions were so severe that he complained of upper abdominal discomfort. Therefore, left phrenic nerve block with 4 ml of 1% lidocaine was performed using the neurostimulation method [4]. The hiccups stopped after the phrenic nerve block, but they recurred 40 minutes later. We repeated the phrenic nerve block, but the hiccups reappeared 45 minutes later. Finally, we elected to use positive pressure ventilation therapy to treat the hiccups. After 8 hours of NPO status, propofol 2.0 mg/kg was administered intravenously. After loss of the eyelash reflex was confirmed, succinylcholine 70 mg was administered, and ventilation was maintained via a facial mask with an air/oxygen mixture containing 50% oxygen and no inhalational anesthetic. A tidal volume of 650 ml was delivered at a rate of 8 breaths per minute, and peak inspiratory pressure (PIP) was 25 cm H<sub>2</sub>O. Two minutes after positive pressure ventilation was begun, the patient began spontaneous ventilation. Ten minutes after injection of propofol, the patient regained full consciousness, and the hiccups did not reappear. The patient discontinued all oral medications, and at the 10 week follow-up, no further episodes of hiccups had occurred.

## DISCUSSION

The etiology of persistent hiccups may include mechanical (tumor, trauma, infection, foreign bodies), metabolic (diabetes mellitus, hyponatremia, hyperkalemia), or pharmacologic (steroids, barbiturates, methyldopa) factors causing irritation of hiccup pathways, and effective treatment of the hiccups requires elimination of these factors [5]. In the case discussed here, the patient was a healthy 41-year-old man. Although brain CT and MRI were not performed, central nervous system causes for hiccups could be excluded because the patient showed no neurological deficits or signs of increased intracranial pressure on clinical examination. In addition, there were no abnormalities on chest X-ray, abdominal ultrasound, or electrolyte analysis. Therefore, it could be concluded that the patient had idiopathic persistent hiccups.

In the present case, physical maneuvers such as

breath holding, drinking of cold water, pharynx stimulation, and application of supraorbital pressure were applied to treat hiccups. Activation of the vagus nerve is believed to be therapeutic in cases of transient hiccupping. However, these methods are usually ineffective in persistent hiccups, because the etiology of persistent hiccups is likely multifactorial [3]. As recent reviews have shown, success in treating hiccups has been reported with pharmacologic treatments including cisapride, omeprazole, baclofen, amitriptyline, valproic acid, and nifedipine [1,3]. Due to the fact that the etiology of persistent hiccups is probably multifactorial, treatment of persistent hiccups frequently requires a combination of pharmacologic agents with different sites of activity [6]. Omeprazole, an inhibitor of gastric acid secretion, and cisapride, a gastroprokinetic agent, are thought to reduce an assumed afferent input from the periphery to a hiccup center [6]. Baclofen is thought to depress reflex hiccup activity [7].

In addition to pharmacologic treatment, interventional methods have been advocated for intractable cases of hiccups. Phrenic nerve block is thought to block the efferent nerve fibers and suppress the reflex arc of hiccups [8]. It has been suggested that if the hiccups do not stop after the first attempt at phrenic nerve block, the nerve block should be repeated [9].

In previous reports, general anesthesia was used to treat persistent hiccups [10,11]. However, it is unclear which component of general anesthesia might account for its therapeutic effects. Continuous positive airway pressure using orotracheal intubation in anesthetized patients has been employed as a treatment option for hiccups, suggesting that stimulation of the oropharyngeal and tracheal areas might be responsible for the treatment effects [10]. It has also recently been reported, however, that persistent hiccups were treated with general anesthesia without orotracheal intubation [11]. In this case, remifentanyl, propofol, cisatracurium, and succinylcholine were administered, and anesthesia was maintained via a facial mask with an air/oxygen mixture containing 60% oxygen and 0.4% enflurane [11]. Inhalational anesthetic might increase the possibility of hiccups via the gamma aminobutyric acid receptor [12]. Therefore, in the present case, inhalational anesthetic was not used. To stop involuntary powerful spasms of the diaphragm and to allow for short-term positive pressure ventilation, succinylcholine was selected. Propofol was also used as a short-acting intravenous an-

esthetic to permit early recovery after abolishment of the hiccups. In the present study, the hiccups continued when the loss of the eyelash reflex induced by propofol occurred, but stopped after injection of succinylcholine followed by positive pressure ventilation. This technique may terminate spasmodic diaphragm contractions by effectively immobilizing the diaphragm. Therefore, positive pressure ventilation and muscle relaxants could be effective in the treatment of idiopathic persistent hiccups.

In conclusion, there are no definite treatments for idiopathic persistent hiccups, but pharmacologic and/or interventional treatments must be considered. If these strategies are ineffective in treating the persistent hiccups, short-term positive pressure ventilation using a short-acting muscle relaxant should be attempted.

## REFERENCES

1. Friedman NL. Hiccups: a treatment review. *Pharmacotherapy* 1996; 16: 986–95.
2. Rousseau P. Hiccups. *South Med J* 1995; 88: 175–81.
3. Launois S, Bizec JL, Whitelaw WA, Cabane J, Derenne JP. Hiccup in adults: an overview. *Eur Respir J* 1993; 6: 563–75.
4. Okuda Y, Kamishima K, Arai T, Asai T. Combined use of ultrasound and nerve stimulation for phrenic nerve block. *Can J Anaesth* 2008; 55: 195–6.
5. Lewis JH. Hiccups: causes and cures. *J Clin Gastroenterol* 1985; 7: 539–52.
6. Petroianu G, Hein G, Petroianu A, Bergler W, Rüter R. Idiopathic chronic hiccup: combination therapy with cisapride, omeprazole, and baclofen. *Clin Ther* 1997; 19: 1031–8.
7. Guelaud C, Similowski T, Bizec JL, Cabane J, Whitelaw WA, Derenne JP. Baclofen therapy for chronic hiccup. *Eur Respir J* 1995; 8: 235–7.
8. Petroianu G. Idiopathic chronic hiccup (ICH): phrenic nerve block is not the way to go. *Anesthesiology* 1998; 89: 1284–5.
9. Moore DC. *Regional block: a handbook for use in the clinical practice of medicine and surgery*. 4th ed. Springfield, IL, Charles C Thomas Publisher Ltd. 1981, pp 138–42.
10. Saitto C, Gristina G, Cosmi EV. Treatment of hiccups by continuous positive airway pressure (CPAP) in anesthetized subjects. *Anesthesiology* 1982; 57: 345.
11. Lierz P, Felleiter P. Anesthesia as therapy for persistent hiccups. *Anesth Analg* 2002; 95: 494–5.
12. Oshima T, Dohi S. Isoflurane facilitates hiccup-like reflex through gamma aminobutyric acid (GABA)<sub>A</sub> and suppresses through GABA<sub>B</sub>-receptors in pentobarbital-anesthetized cats. *Anesth Analg* 2004; 98: 346–52.