

CASE REPORTS

J: Influence of plasma cholinesterase activity on recovery from mivacurium induced neuromuscular blockade in phenotypically normal patients. *Acta Anaesthesiol Scand* 36:702-706, 1992

5. Ostergaard D, Jensen E, Jensen FS, Viby-Mogensen J: The duration of action of mivacurium-induced neuromuscular block in patients homozygous for the atypical plasma cholinesterase gene (abstract). *ANESTHESIOLOGY* 75:A774, 1991

6. Lehmann H, Liddell J: Human cholinesterase (pseudocholinesterase): Genetic variants and their recognition. *Br J Anaesth* 41:235-244, 1969

7. Viby-Mogensen J, Hanel HK: Prolonged apnoea after suxamethonium: An analysis of the first 225 cases reported to the Danish cholinesterase research unit. *Acta Anaesthesiol Scand* 22:371-380, 1978

8. Whittaker M: Plasma cholinesterase variants and the anaesthetist. *Anaesthesia* 35:174-197, 1980

9. Robertson GS: Serum protein and plasma cholinesterase changes in association with contraceptive pills. *Lancet* 1:232-235, 1967

10. Vickers MD: The cholinesterases and their significance to the anaesthetist using muscle relaxants. *Anaesthesia* 35:528-534, 1963

11. Mirakhur RK: Edrophonium and plasma cholinesterase activity. *Can J Anaesth* 33:588-590, 1986

12. Viby-Mogensen J, Hanel HK: A Danish cholinesterase research unit. *Acta Anaesthesiol Scand* 21:405-412, 1977

13. Whittaker M, Vickers MD: Initial experiences with the cholinesterase research unit. *Br J Anaesth* 42:1016-1020, 1970

Anesthesiology
78:1184-1186, 1993
© 1993 American Society of Anesthesiologists, Inc.
J. B. Lippincott Company, Philadelphia

Cervical Epidural Block Can Relieve Postoperative Intractable Hiccups

Shigehito Sato, M.D.,* Nobuaki Asakura, M.D.,† Takuo Endo, M.D.,† Hiroshi Naito, M.D., Ph.D.‡

PERSISTENT hiccups after abdominal surgery are stressful for patients. While a variety of treatments for hiccups have been reported,¹⁻³ no "cure" stands out as the most effective. We describe two patients in whom intractable postoperative hiccups were treated successfully by cervical epidural block.

Case Reports

Case 1

A 57-yr-old man underwent cholecystectomy for cholecystitis under a combination of general (nitrous oxide, enflurane) and epidural

anesthesia. During the operation, hiccups occurred twice and were treated with 20 mg succinylcholine on each occasion.

Three days after surgery, hiccups recurred. No subphrenic abscess was confirmed by echography. Nasopharyngeal stimulation, aspiration of the stomach, 20 mg metoclopramide, and 50 mg intravenous chlorpromazine failed to stop the hiccups. The patient became severely depressed and experienced difficulty sleeping because the hiccups were continuous. On the 7th day after surgery, melena and fresh blood from the nasogastric tube were observed. Gastroscopy revealed a gastric ulcer, and gastrectomy was planned. General anesthesia was maintained with nitrous oxide and enflurane, and muscle relaxation was achieved using 6 mg pancuronium bromide. After the administration of pancuronium bromide, the hiccups disappeared. Gastrectomy was performed, and surgeons could find no cause of the hiccups. After reversal of paralysis, the hiccups recurred.

In the surgical postoperative unit, a continuous infusion of droperidol (1.6 mg/h) was started, and epidural block at the T5 intervertebral space was performed with 10 ml 1.5% lidocaine. Although analgesia was obtained from T3 to T11, the hiccups continued. On the next day, a cervical epidural catheter was placed at the C7 intervertebral space and 8 ml 1.5% lidocaine was injected through the catheter. Hiccups stopped 10 min after the injection. The hiccups did not appear for the next 1.5 h. The analgesic level was from C3 to T4 bilaterally. The position of the diaphragm in the chest x-ray appeared unchanged from where it had been before the block, and the patient did not complain of dyspnea. As 8 ml 0.5% bupivacaine was effective in suppressing the hiccups for 4-5 h, the same dose was injected every 6 h. Although minimal hiccups appeared just before the next injection, a bolus 6 ml 1.5% lidocaine was effective

* Associate Professor of Anesthesiology.

† Resident.

‡ Professor and Chairman of Anesthesiology.

Received from the Department of Anesthesiology, Institute of Clinical Medicine, University of Tsukuba, Tsukuba-shi, Ibaraki-ken, Japan. Accepted for publication February 18, 1993.

Address reprint requests to Dr. Sato: Department of Anesthesiology, Institute of Clinical Medicine, University of Tsukuba, Tsukuba-shi, Ibaraki-ken, Japan 305.

Key words: Anesthetic techniques: cervical epidural; phrenic nerve block. Complications: intractable hiccups.

CASE REPORTS

in stopping them. The patient felt relief and could sleep comfortably. On the 2nd day after the onset of cervical epidural block, the droperidol was stopped. However, hiccups recurred 8 h after the cessation of droperidol, and droperidol was restarted. On the 3rd day, the dose was changed to 6 ml 0.5% bupivacaine per day and droperidol 0.8 mg/h. On the 13th day after the first surgery, the hiccups disappeared. The epidural block and droperidol were discontinued.

Case 2

A 61-yr-old man underwent gastrectomy and cholecystectomy for gastric cancer and cholelithiasis. Anesthesia was maintained with 60% nitrous oxide, oxygen, and 0.3–0.5% isoflurane in combination with epidural anesthesia. The patient did well until the 10th postoperative day, when intractable hiccups began. Treatment with chlorpromazine, metoclopramide, and other tranquilizers was ineffective. He complained of sleeplessness and inability to eat. After 12 days of persistent hiccups, cervical epidural block was performed at the C7 intervertebral space with 8 ml 2% lidocaine. The hiccups decreased after about 10 min, stopped after 45 min, and did not recur. The analgesic level confirmed 15 min after the block was from C3 to T6 bilaterally. The patient felt at ease and did not complain of dyspnea.

Discussion

We describe two cases of intractable hiccups resistant to conventional treatments. Case 1 was well controlled by continuous cervical epidural block combined with droperidol. Case 2 was treated with only a cervical epidural block in a single injection.

The afferent portion of the neural pathway of hiccup formation is composed of the vagus nerve, the phrenic nerve, and the sympathetic nerve chain arising from T6 to T12. The efferent limb is the phrenic nerve.⁴ Thus, a nerve block of some part of this pathway might be an effective treatment for hiccups.

In case 1, extended thoracic epidural block from T3 to T11 was ineffective. We thus can assume that a block of the afferent portion of the sympathetic nerves was of no use in stopping hiccups. After cervical epidural block, in both cases the extent of block was sufficient to cover the levels supplying the phrenic nerve (C3–C5). Since respiration in the both cases showed no abnormal patterns, we assumed that the phrenic nerve was partially blocked without serious effect on diaphragmatic respiration.

If hiccups persist despite common physical maneuvers such as pharyngeal stimulation or gastric aspiration, drug therapy usually becomes necessary. Chlorpromazine is more effective in treating hiccups when

given intravenously, especially after a single intravenous bolus of 50 mg. Haloperidol also has been reported to be effective in "several" patients, perhaps related to its dopamine antagonist effect.^{5–7} The effective dose appears to be 3–12 mg/day.⁶ In case 1, we used droperidol, which also has the ability to antagonize the actions of dopamine on specific areas of the nervous system.⁸

For hiccups unresponsive to both physical maneuvers and drug therapy, block of the phrenic nerve can be considered, especially in patients in whom persistent hiccups are the cause of significant discomfort such as in those presented here. A temporary phrenic nerve block, using a long-acting agent such as bupivacaine, should be attempted. However, selective bilateral block of the phrenic nerves is difficult to achieve, even with the use of a nerve stimulation,⁹ and phrenic nerve blocks have not been uniformly successful in terminating hiccups.^{10–12}

Safety with the cervical epidural block has been reported elsewhere.¹³ In the two cases presented here, ventilatory difficulty secondary to phrenic nerve paralysis was not observed. However, cervical epidural block for a patient showing hiccups may be difficult to perform because of the intermittent movements of the patient. Furthermore, before performing the block, caution should be exercised concerning the assessment of volume status and preparation for treatment of hypotension, bradycardia, and respiratory impairment—all possible side effects of cervical epidural block.

In conclusion, cervical epidural block may be an effective treatment for persistent intractable hiccups.

References

1. Lewis JH: Hiccups: Causes and cures. *J Clin Gastroenterol* 7: 539–552, 1985
2. Williamson BWA, Macintyre IMC: Management of intractable hiccup. *Br Med J* 2:501–503, 1977
3. Rosenberg J, Hansen BJ: Possible role of autonomic afferents in treatment of postoperative hiccups. *Lancet* 2:873, 1989
4. Salem MR, Baraka A, Rattenborg CC, Holaday DA: Treatment of hiccups by pharyngeal stimulation in anesthetized and conscious subjects. *JAMA* 202:126–130, 1967
5. Korczyn AD: Hiccup. *Br Med J* 2:590–591, 1971
6. Scarnati RA: Intractable hiccup (singultus): Report of case. *J Am Osteopath Assoc* 79:127–129, 1979
7. Ives TJ, Fleming MF, Weart CW, Bloch D: Treatment of intrac-

CASE REPORTS

table hiccups with intramuscular haloperidol. *Am J Psychiatry* 142:1368-1369, 1985

8. Baldessarini RJ: Drugs and the treatment of psychiatric disorders, *The Pharmacological Basis of Therapeutics*. Edited by Gilman AG, Rall TW, Nies AS, Taylor P. New York, Pergamon, 1990, pp 383-429

9. Eisele JH, Noble MIM, Katz J, Fung DL, Hickey RF: Bilateral phrenic-nerve block in man: Technical problems and respiratory effects. *ANESTHESIOLOGY* 37:64-69, 1972

10. Samuels L: Hiccup: 10 year review of anatomy, etiology, and treatments. *Can Med Assoc J* 67:315-322, 1952

11. Nathan MD, Leshner RT, Keller AP Jr: Intractable hiccups (singultus). *Laryngoscope* 90:1612-1618, 1980

12. Shay SS, Myers RL, Johnson LF: Hiccups associated with reflux esophagitis. *Gastroenterology* 87:204-207, 1984

13. Dohi S, Takeshima R, Naito H: Ventilatory and circulatory responses to carbon dioxide and high level sympathectomy induced by epidural blockade in awake humans. *Anesth Analg* 65:9-14, 1986