HALOTHANE FOR STATUS ASTHMATICUS IN THE INTENSIVE CARE UNIT – A CASE REPORT

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THE β_2 STIMULATING EFFECT of halothane, resulting in bronchial dilatation, has been established.[1] In the following case this effect was used in treating prolonged bronchospasm unresponsive to conventional medical therapy.

CASE REPORT

The patient was a 38-year-old 85 kg male with an eight-year history of bronchial asthma. The treatment had been self-administered isoproterenol inhalations. The patient was also known to have bronchial hypersensitivity to acetyl salicyclic acid. He arrived at the Emergency Department in severe bronchospasm, one hour following the ingestion of acetyl salicylic acid and tetracycline which had been prescribed for an acute episode of wheezing and dyspnoea. He had attempted to control the bronchospasm with repeated isoproterenol inhalations. Within five minutes of arrival he had a cardiopulmonary arrest, complicated by aspiration of solid and liquid stomach contents. The trachea was intubated and he was successfully resuscitated and bronchoscoped. Manual ventilation was extremely difficult. Treatment was begun with intravenous hydrocortisone sodium succinate 1 gram, aminophylline 350 mg as a slow bolus injection plus 100 mg/hour as a drip, and salbutamol 0.5 ml by nebulization. The patient was transferred to the Intensive Care Unit where the lungs were ventilated with a Bennett MA-1. Relaxation with pancuronium was necessary to achieve adequate ventilation. Peak inspiratory airway pressures remained above 4.9 kPa (50 cm H_2O).

During the next 24 hours the patient received hydrocortisone 500 mg intravenously q. 6 hours, aminophyllin 800 mg/1000 ml q. 8 hours, salbutamol 0.5 ml by nebulization q. 2 hours, penicillin G.K. 2.5 million units intravenously q. 6 hours. He was bronchoscoped twice and was given chest physiotherapy.

Despite these measures the patient remained in status asthmaticus with high peak inspiratory airway pressures, hypercarbia and an elevated A-a gradient for oxygen. Consequently it was decided to administer halothane in an attempt to "break" the bronchospasm.

An anaesthetic machine with an Air Shields ventimeter was brought from the Operating Room to the Intensive Care Unit and ventilation was changed from the MA-1 to the ventimeter. Blood pressure, electrocardiogram, static and dynamic effective compliances and arterial blood gases were monitored. One hundred per cent oxygen with 0.5 per cent to 1.0 per cent halothane was administered. There was a gratifying reduction in peak inspiratory airway pressure to 3.4 kPa (35 cm H_2O) and increases in both dynamic and static effective compliances, as shown with associated blood gas data in Table I. The cardiovascular status remained stable throughout. Halothane was discontinued after one hour. The patient continued to improve. The trachea was extubated after two days and he was discharged from the hospital five days later.

DISCUSSION

The case presented is an example of status asthmaticus precipitated by infection and acetyl salicylic acid ingestion,[2] complicated by excessive self-administered isoproterenol[3] and by cardiopulmonary arrest with aspiration.

Senior, Lefrak and Koremblat[4] have reviewed the medical emergency management of status asthmaticus which they define as a life-threatening episode that is unresponsive to vigorous therapy with epinephrine, aminophylline, aerosolized bronchodilators and hydration. They identify three main categories of therapy: (*a*) mobilization of tracheobronchial secretions by hydration and chest physiotherapy (*b*) drug therapy with parenteral steroids and aminophylline (*c*) improvement of alveolar gas exchange with oxygen therapy, supplemented when necessary by mechanical ventilation.

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TABLE I

COMPLIANCE AND ARTERIAL BLOOD GAS DATA. TIME 0 REPRESENTS DATA IMMEDIATELY PRIOR TO THE COMMENCEMENT OF HALOTHANE ADMINISTRATION

Time (min)	Dynamic effective compliance (l/cm H_2O)	Static effective compliance (l/cm H_2O)	Arterial Blood Gases			
			Fi_{O_2}	pH	P_{O_2}	P_{CO_2}
0	0.020	0.040	0.7	7.32	65	48
30	0.033	0.050				
60	0.033	0.050	1.0	7.35	92	45
90	0.033	0.055	0.7	7.41	80	31
570	0.030	0.063	0.6	7.39	72	38

Despite 24 hours of these measures our patient remained in severe bronchospasm and the lungs continued to be difficult to ventilate. Halothane administration effected a rapid improvement as shown by a decrease in peak inspiratory airway pressure from 4.9 to 3.4 kPa (50 to 35 cm H_2O) and an associated increase in dynamic effective compliance from 0.020 to 0.033 l/cm H_2O (a 65 per cent increase). Simultaneously, the static effective compliance increased from 0.040 to 0.050 l/cm H_2O (a 25 per cent increase). The determination of both dynamic and static effective compliance are easy and an important means of separating airway resistance and compliance factors in the clinical setting.[5,6]

Halothane can clearly reduce airway resistance by β_2 receptor stimulation. Its use in status asthmaticus receives only sporadic mention in the literature but as shown by this case, it can serve as a useful adjunct in the management of these difficult patients. However, it is important to realize that the role of halothane is limited because it is probable that the dominant pathological change in status asthmaticus is not "bronchospasm" but rather plugging of the airways with mucus.[4]

SUMMARY

A case report is presented demonstrating the beneficial β_2 stimulating effect of halothane in a patient with status asthmaticus unresponsive to adequate conventional therapy. Twenty-four hours after the commencement of therapy, 0.5 per cent to 1.0 per cent halothane was administered for one hour with sustained reductions in peak inspiratory airway pressure and increases in dynamic and static effective compliances.

RÉSUMÉ

Les auteurs présentent le cas d'un malade souffrant d'un état de mal asthmatique réfractaire à la thérapie conventionnelle. Cette observation démontre les effets favorables de la stimulation des récepteurs β_2 par l'halothane. Après vingt quatre heures de traitement inefficace, on a administré de l'halothane aux concentrations de 0.5 à 1.0 pour cent pendant une heure. L'inhalation de cet agent eut pour effets une diminution soutenue de la pression inspiratoire de pointe et une augmentation de la compliance dynamique et statique efficace.

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