ACCIDENTAL STRYCHNINE POISONING

A Case Report

BY

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SUMMARY

The management of acute strychnine poisoning in a child is described. Convulsions of typical character occurred with full spinal tetanus followed by respiratory arrest. Aims of management were control of convulsions, maintenance of a clear airway, with adequate respiratory exchange, and elimination of poison from the stomach. Sufficient thiopentone sodium was given rectally to suppress the convulsions without undue circulatory or respiratory depression. The danger of exchanging strychnine for barbiturate poisoning is stressed. Passage of a cuffed endotracheal tube prior to gastric lavage is recommended. The possible use of specific muscle relaxant drugs and long-term care are briefly considered.

The incidence of accidental poisoning in children is high. Young children sometimes poison themselves by swallowing drugs prescribed or bought for use by adults, especially when the drugs are dispensed as pills or tablets resembling sweets.

The preparation known as Easton's tablets has a reputation as a bitter "tonic" and is widely used by adults as such. It contains strychnine. Two strengths of the tablets are obtainable, equivalent to either one milligram or half a milligram. The pharmacopoeial dose for the adult is one tablet.

It is not surprising that cases of accidental strychnine poisoning in young children from swallowing tablets containing the alkaloid are encountered in appreciable numbers.

Recently our advice and assistance was urgently sought in one such instance.

CASE REPORT

A boy, aged 18 months, was admitted to the paediatric ward as a medical emergency on April 19, 1962, at 2 p.m. He had been driven rapidly to hospital in a police car from his home a little over a mile distant. The history, given by the mother, was that the boy had swallowed 19 Easton's tablets 90 minutes previously, and had had three convulsions in the 40 minutes preceding his transfer to hospital. A neighbour had administered an emetic (salt and water), after which the child vomited. Within 7 minutes of his admission he had a convulsive seizure lasting about a minute. At the beginning the involuntary movements were intermittent but within a few seconds a full spinal tetanus appeared with the characteristic opisthotonos, trismus and risus sardonicus. Respiration was quickly stopped from involvement of the diaphragm and the muscles of the thorax and abdomen in the general muscle spasm. The apnoea was accompanied by deep cyanosis and clouding of consciousness.

Immediately following the attack the patient was placed in an oxygen tent, wherein he had another similar convulsion within a period of 15 minutes. The duty anaesthetist was now summoned. On arrival in the ward he found the patient's general condition to be poor but not desperate. The boy was conscious. Reflex irritability was not pronounced. With but one direction from the senior paediatrician—namely, to bring the convulsions under control before carrying out gastric lavage—the conduct of treatment was left to the anaesthetist and was as follows.

The child was weighed and thereafter placed in a cot in the lateral position with a 15° head-down tilt. Thiopentone sodium in a water-miscible mineral oil suspension was then instilled into the rectum. The dose calculated from the measured body weight of 20 kg was 400 mg and this was given in two fractions at an interval of 10 minutes. Under the influence of the barbiturate the child's muscles remained relaxed.

He was breathing spontaneously and freely, and when allowed to breathe air alone his colour stayed pink. The respiratory rate was 22 breaths per minute and pulse rate 100 b.p.m. No artificial airway was inserted and the canopy of the oxygen tent was rolled up and kept so.

A wide-bore rubber tube was next passed through the mouth into the stomach and 200 ml of fluid and semi-fluid debris evacuated. Gastric lavage was performed using firstly warm water only, then a solution of potassium permanganate (3.8 g in 9 l water), and finally a strong infusion of tea.

The stomach washout completed, the child was left undisturbed and was carefully observed over a period of 8 hours, the anaesthetist remaining within easy reach of the ward. The ward resident was advised that wakefulness, muscle twitchings and increased reflex excitability were the signs indicating the need for further barbiturate medication, and he was instructed that this medication was to be given by the anaesthetist and none other. In fact, no additional thiopentone sodium was required. No further convulsions occurred and no pulmonary complications developed. The child was discharged home from hospital on the morning of April 23, apparently none the worse for his ordeal.
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DISCUSSION
Diagnosis presented no problem in this case. There was the history of the patient having swallowed Easton's tablets and the typical spinal convulsions, precipitated by mild sensory stimuli, were manifested.

The tablet strength was not known. The total amount of strychnine hydrochloride was either 19 mg or 9.5 mg, the stronger tablet being the equivalent of 4 ml of Easton's syrup and therefore containing 1 mg of the alkaloidal salt. The therapeutic dose of strychnine hydrochloride for an adult as set down in the Extra Pharmacopoeia (Martindale, 1952) is 2–8 mg by mouth.

It is accepted that in the management of acute strychnine poisoning the essentials are control of convulsions, preservation of an adequate airway, maintenance of adequate ventilation, gastric evacuation and lavage, supportive therapy until the poison is catabolized and excreted, and constant surveillance of the patient for many hours.

There is no specific antidote to strychnine but there is a marked degree of antagonism between the stimulating action of strychnine and the depressant action of the barbiturates on the central nervous system. Goodman and Gilman (1956) have stated that rational therapy requires the use of the barbiturates in strychnine poisoning. The short-acting thiopentone sodium is very effective. Most toxicologists recommend that it be administered intravenously. On the particular occasion described it was given per rectum, largely on account of the urgent need for treatment and of the instant availability of the drug in rectal suspension form. It produced the desired result. In full basal narcotic dosage it achieved a degree of depression sufficient to inhibit convulsions and keep the patient asleep, and yet not so intense as to depress markedly respiration or arterial blood pressure.

It occurred to us at the time that, with gastric evacuation and gastric lavage carried out in deep plane basal narcosis when the activity of the upper respiratory protection reflexes is impaired, there was the possibility of tracheobronchial soiling (Nilsson, 1952). On further reflection we are convinced of this. In acute strychnine poisoning the passage of a stomach tube may precipitate a convolution. Evacuation of the stomach and gastric lavage must be postponed until the convulsions have been subdued by the use of thiopentone (Statham, 1956). It must be further postponed until the narcotized patient is provided with artificial protection against the entry of foreign material into the trachea and bronchi. The insertion of an endotracheal tube and inflation of its cuff will form a barrier. The insertion of the tube can be facilitated by the intravenous injection of a specific muscle relaxant. Controlled respiration will be required until the effect of the relaxant has worn off (Hawkins, 1962).

When the repeated doses of thiopentone are necessary to maintain the reflex excitability of the central nervous system within fairly normal limits until the strychnine has been detoxicated and eliminated there is the likelihood of cumulation of the barbiturate. This, in effect, might be the exchange of strychnine convulsions for acute barbiturate intoxication. The latter condition in itself carries the threat of medullary paralysis from hypoxia. There is a ready answer to this problem, and that is to re-establish or perpetuate the neuromuscular block previously induced and to institute intermittent positive-negative pressure respiration, extending the artificial ventilation for as long as is required. With the patient on a ventilator attention must be paid to the usual precautions of frequent, regular changes of position, frequent aspiration of tracheobronchial secretions, and adjustments of fluid and electrolyte balance.

ACKNOWLEDGMENTS
We are indebted to Dr. D. H. Wallace, visiting paediatrician, for the privilege of being in attendance on this case.

REFERENCES

SOMMAIRE
Les auteurs décrivent le traitement d'une intoxication aigue par la strychnine chez un enfant, présentant des convulsions typiques et une tétranie complète, suivie d'arrêt de la respiration. Le traitement avait pour but...

Anaesthetists have been quick to realize that the clinical care of their patients can be greatly furthered by an adequate knowledge of lung function and to this end probably no book has played a more important part than The Lung. The arrangement of the first part of the book and the illustrations substantially the same as before. Successive chapters deal with lung volumes, ventilation, pulmonary circulation, diffusion, blood gases and mechanics of breathing. The chapters are all generally expanded, and include much new work in the field. More attention is now devoted to the difficult subject of pressures within the pulmonary circulation (intravascular, transmural and driving) and to the concept of pulmonary vascular resistance. The presentation of abnormalities of distribution, which was perhaps the most striking feature of the first edition, is now amplified to give excellent practical guidance on the assessment of maldistribution.

The chapter on Diffusion is not greatly altered and does not discuss recent trends towards the belief that the alveolar-end pulmonary capillary Po2 gradient may be very much smaller than has hitherto been believed, thereby destroying the significance of the diffusing capacity and the validity of its measurement by the two-level oxygen approach of Riley.

There is much new material in the chapter on Mechanics of Breathing. Stress is laid upon the relationship of compliance to lung volume and the interpretation of compliance by F. R. C. The role of surface tension in elastic recoil is discussed and the reader is introduced to the "surfactant" in the alveolar lining fluid. The use of the body plethysmograph is described in relation to measurement of lung volumes, pulmonary blood flow and airway resistance.

The biggest changes in the second edition are in Part III—Clinical Applications. This section starts with a useful classification of pulmonary function tests, and is followed by a discussion of patterns of respiratory dysfunction, illustrated by clinical examples. The next chapter deals with pulmonary disability, dyspnoea, and the pre-operative assessment of respiratory function. Five pages are devoted to respiratory problems before, during and after anaesthesia. Of course these problems cannot receive full attention in such a short space and it does seem unfortunate that the most recent reference is from 1956. We are left with the tantalizing problem of a man under cyclopropane anaesthesia who had a Pco2 of 90 mm Hg, and a minute volume of 9.2 l./min. I suppose the more cynical of us would look in the canister before the lungs. A new chapter on Physiological Therapy is excellent, and includes the basis of artificial ventilation, oxygen therapy and treatment of pulmonary oedema.

As before, Part III comprises normal values, symbols, equations and calculations. It is now expanded to contain a comprehensive collection of charts for prediction of normal values, including Radford's nomogram. There are fourteen pages of classified references (small type) and an adequate index.

It is difficult to find fault with this excellent book. It should, however, be stressed that, despite the clinical orientation, this book is largely written by physiologists who run a consultant service for patients. The authors are not directly concerned with patient care and this probably explains why there is no reference to such techniques as the micro-Astrup and the rebreathing method for Pco2, which have proved so valuable in the day-to-day care of patients. It should also be remembered that values for the maximum expiratory flow rate in this book refer to the slope of a forced expiratory spirogram. This measurement overlooks transient high flow rates which are detected by the Wright peak flow meter and, to an even greater extent, by the pneumotachograph. For this reason the quoted values for maximum expiratory flow rates appear low to those more familiar with other methods. It may also explain the remarkable patient on page 223 who had a maximum expiratory flow rate considerably less than his maximum voluntary ventilation.

The Lung is a masterpiece of lucid exposition and deals with problems which are all too familiar to the anaesthetist. This book is a "must".

J. F. Nunn