and pushing at this stage may court disaster, particularly with chloroform.

The tendency to failure of heart and respiration seems greater than at home, probably climatic in origin, and is undoubtedly aggravated by the highly nervous condition in which so many patients come to operation.

A somewhat lighter anaesthesia can be maintained than in England. The corneal reflex is rarely lost, its presence even during the primary skin incision seems to have little effect. In one instance, as far as I am aware a unique one, at the close of the operation when the patient was coming round, but with no evidence of retching, he suddenly sneezed; this was followed immediately by complete cessation of respiration, which had to be maintained artificially for over five minutes, with ultimate recovery. The pulse was good throughout.

Sweating is often profuse, especially in a subject in a bad condition; this is undoubtedly largely climatic; for this reason a fan is contraindicated in a theatre if a laparotomy or other serious operation is in progress.

Pituitrin is a drug I have found it necessary to resort to more frequently during operations than at home, with the same valuable results in augmenting the heart's action and countering shock.

Post-anaesthetic vomiting is rare and never troublesome, but a little retching before leaving the table is common. I have seen no case of post-anaesthetic acidosis or delayed poisoning in the tropics.

Nitrous oxide is little used in India, but anaesthesia with it is in every way satisfactory. The gas is now made locally, but is rarely obtainable except for dental work.

Ethyl chloride I have never seen used in India as a general anaesthetic; it is too volatile for the climate.

In the course of a considerable experience in India I have been perhaps fortunate in having no fatalities. Extreme care, continual watching of the patient, maintaining an even anaesthesia, and the use of a suitable anaesthetic or mixture, together constitute in my opinion the secret of obtaining satisfactory results in the tropics.

NOTES ON A CASE OF POISONING BY HYDROQUINONE.

BY

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THE three isomeric dihydroxybenzenes, $C_6H_4(OH)_2$, possess toxic properties in varying degree. It is stated that the toxicity of the various phenols increases in general with the number of hydroxyl groups. Resorcinol (meta-dihydroxybenzene) is an exception, being less toxic than ordinary phenol (C_6H_5OH). Both hydroquinone (para-dihydroxybenzene) and catechol (ortho-dihydroxybenzene) are stated to be more toxic.

Cushny¹ states:

The three dihydroxybenzenes resemble carbolic acid in their effects, but produce more intense stimulation of the central nervous system, for convulsions have been observed in man after their use. This is especially true for catechol and hydroquinone, resorcinol being much less toxic than these.

Records of cases of poisoning by the dihydroxybenzenes are very few in number.

Dixon Mann records a case by Murrell² of poisoning by resorcinol, and also states that "in another case epileptiform convulsions occurred,"³ but no record of a case of hydroquinone poisoning is mentioned. A case is also recorded⁴ in which 1 gram of resorcinol gave rise to perspiration, retraction of the head, and muscular stiffness. J. Gadamer⁵ states with regard to resorcinol, "although the least poisonous of the phenols, it has frequently given rise to serious poisoning." In one case 10 grams of resorcinol produced profuse perspiration, dyspnoea, convulsions, opisthotony, and loss of consciousness.

We have found no detailed record of any cases of hydroquinone poisoning; it is, however, stated⁶ that doses of 0.5 to 1 gram have frequently caused slight poisoning, accompanied by sickness, giddiness, delirium, and collapse.

The following case of poisoning by hydroquinone (followed by recovery) may, in the absence of many such records, be of interest.

Clinical History.

D. H., aged 21, single, was admitted to the Warneford Hospital, Leamington, on June 26th, at 9 p.m., as a supposed case of poisoning, with the history of being suddenly taken ill. On admission patient was unconscious and pallid in appearance. Some blood-stained foam was observed at the mouth, the lips were pale, but no staining was seen round the mouth. No odour of the breath was discerned; the skin was cold and clammy. The temperature was subnormal, the pulse fast and feeble. The pupils were equal, medium in size, and reacting to light; the conjunctivae insensative to touch. The knee jerks were absent, there was no ankle or patellar clonus, the plantar reflex was present. On auscultation a soft mitral systolic bruit was heard. The lungs were clear. No vomiting or diarrhoea was present. There was retention of urine, and examination of a catheter specimen showed the urine to be greenish in colour, acid, specific gravity 1010, a heavy cloud of albumin, no sugar.

About ten minutes after admission the patient had a violent convulsion, in which the head was thrown back, the eyes looked upwards, and the pupils were dilated. The fingers were bent into a cone shape, the thumb bent across the palm of the hand, and the whole body was flung into violent clonic movements. Respiration became very shallow until imperceptible, after which it began to improve. This convulsion was followed soon afterwards by another, and at short intervals by other convulsions to the number of eight. After 10.30 p.m. (an hour and a half after admission) no further convulsions were observed. From 10.30 p.m. till midnight the patient remained in a semi-conscious condition, but after midnight consciousness was recovered, and though vomiting several times she passed a fairly comfortable night.

The patient was treated as a case of poisoning, and the stomach washed out frequently with sterile water. Ether was given subcutaneously, and the bodily warmth kept up. Next day she was fully conscious, but still appeared very weak. The knee-jerks were still absent, and a sample of urine passed normally showed a specific gravity 1023, colour dark, but no albumin. On June 28th knee-jerks were present, and from that date on the patient progressed steadily.

As no history could be obtained of the patient taking any drug previous to admission, and as she stated she had suffered from no previous illness, a sample of the first stomach washings (obtained immediately after admission) was sent for analysis.

Chemical Analysis.

Hydroquinone, or quinol (para-dihydroxybenzene) is a crystalline substance readily soluble in water, alcohol and ether. It has, like its isomers, a limited use in medicine, but considerable application in photography.

In the present case the stomach washings were submitted to chemical examination for alkaloids, glucosides, etc., by a modified Stas-Otto process. The resulting aqueous solution was extracted whilst still in an acid condition, with ether, and the ethereal extract evaporated to dryness. A fine crystalline residue was obtained which was further purified by dissolving in alcohol and treating with a small quantity of blood charcoal, and the extract was evaporated to dryness. After drying at 100° C. for one hour the melting point was taken. The substance began to soften at 163° C., and completely melted at 166° C. It had a sweetish taste, was readily soluble in water, and gave the following reactions:

It reduced silver nitrate solution in the cold. On alkalinizing with sodium hydrate solution the liquid rapidly darkened. Fehling solution was reduced without heating. Froehde's reagent gave deep purple, gradually becoming chocolate brown and later green and greenish-blue. Millon's reagent gave yellow colour, gradually deepening to orange-yellow, depositing a reddish-orange coloured precipitate.

The melting point of the purified residue mixed with an equal amount of pure hydroquinone (melting point 169° C.) was found to be 164 to 165° C. [It may be stated that pure hydroquinone, originally melting at 169° C., extracted by ether from aqueous solution and the ethereal solution evaporated to dryness, further dried at 100° C. for two hours, gives a melting point of 166° C.]

The amount of hydroquinone in the portion of the stomach washings submitted for analysis was 2 grains. The total amount of the first stomach washings (of which only 8 oz. were sent for analysis) was 4 pints. The quantity of hydroquinone present in the whole of these washings was therefore 20 grains. It was impossible to obtain any data which would enable us to arrive at a conclusion as to the amount of the drug taken. The washings were further examined for poisons other than hydroquinone (especially strychnine), but none was detected.

We are indebted to Dr. Cole, visiting physician to the Warneford Hospital, for permission to publish these notes; and to Dr. P. Haas of University College for valued co-operation.

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