The efficacy and dosage of curare preparations are considered, and techniques employing trilete for abdominal cases and cyclopropane for thoracic cases described.

Twenty cases with ocular complications are reported. The effect of curare on the blood pressure and on severe laryngeal spasm is also mentioned.

An analysis of post-operative results is given and eight deaths after curarization are discussed.

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d-TUBOCURARINE CHLORIDE IN ELECTRO-CONVULSION THERAPY

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It is now generally known that *d*-tubocurarine chloride is used to obtain good relaxation in general anaesthesia. Its value as an aid in electro-convulsion therapy may, however, be of equal importance. Griffith (1946) reviews the history and present knowledge of the clinical use of *d*-tubocurarine chloride, with special reference to anaesthesiology, and discusses the physiological action of the drug. A further review of the literature is given by Kellgren *et al.* (1946).

An obstacle to the use of electro-convulsion therapy in feeble persons has been the strain imposed on the skeletal structure by the violent muscular contractions produced. *d*-Tubocurarine chloride enables electro-convulsion therapy to be given in cases in which the physical condition would otherwise be a contraindication.

Methods.—The drug is given intravenously, and in our experience it is advisable to test the patient's tolerance with small doses before electro-convulsion therapy. We commence with 1 mg. per stone (6.4 kg.) of body weight, and this is increased on successive days until the patient is just unable to raise the head from the pillow after about four to five minutes. Electro-convulsion therapy is then given in the usual way.

One of our cases was a woman who in attempting suicide had sustained a fractured surgical neck of the humerus and a fractured pelvis. She was in a state of acute melancholia and actively suicidal. Electro-convulsion therapy was required, but the recent bone injuries made its administration impracticable. Under the influence of 15 mg. of *d*-tubocurarine chloride the electroplexy produced a mere "purring sensation" in the muscles. This procedure was repeated on six occasions and she made a good psychiatric recovery; and she was up and about, with a good orthopaedic result, when she left hospital.

Another illustrative case was that of a reactive depression in a man of 34 who complained of severe pain in his back after one dose of electro-convulsion therapy. X-ray examination showed no bony injury of the vertebrae, but in the ordinary way treatment would have been discontinued. With *d*-tubocurarine chloride it was possible to continue treatment. His pain has now gone and he has made a social recovery. This was one of our early cases, and an initial dose of 20 mg. was given. There was marked respiratory paralysis and apparent loss of consciousness. The pulse remained of good volume and regularity throughout, and after about five minutes' artificial respiration normal respiratory rhythm recommenced. An interesting feature was that the patient was later able to give an account of the artificial respiration and other restorative measures (physostigmine, etc.), taken during a period when he appeared to be deeply unconscious. It seems then that the drug, despite its dramatic effect on motor activity, had little influence on the sensorium. This is in agreement with the findings of Kellgren *et al.* (1946).

Conclusion.—*d*-tubocurarine chloride appears to be effective in minimizing convulsions in electro-convulsion therapy. Although both *d*-tubocurarine chloride and electro-convulsion therapy are respiratory depressants no synergistic action between the two has been noted with the relatively low dosage used.

We wish to thank Dr. F. Back, Medical Superintendent, Cherry Knowle (Sunderland Mental Hospital), for providing the facilities for this work.

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Medical Memoranda

Unusual Case of Poisoning by Zinc Sulphate

The following case seems worth recording because of the unusual sequelae. In the literature at my disposal I cannot find any description of a similar sequence of clinical events.

CASE HISTORY

An Indian woman aged 35 was admitted into the General Hospital, Johore Bahru, Malaya, at 9.30 a.m. on March 4, 1946. About one and a half hours previously she had taken a dose of "salts" for constipation, and this was followed in a few minutes by vomiting and purging. The substance swallowed was mistaken for Epsom salt, and approximately 1 oz. (28 g.) was taken. The bottle with the remaining noxious contents was brought to hospital, and the white crystals proved on analysis to be zinc sulphate. The vomitus contained the same substance.

On admission the patient was acutely collapsed and very restless. There was no abnormality of the lips, tongue, or buccal mucosa. Treatment with demulcents, morphine, and nikethamide produced marked improvement within twelve hours. On March 5 her general condition was satisfactory, and vomiting had ceased. There had been no haematemesis. She complained of abdominal pain of a colicky nature, but examination revealed no abnormality. The temperature was normal, there was a persistent tachycardia of 90 to 100 a minute, and examination of her urine showed no abnormality, chemically or microscopically. On the 6th progress was well maintained, and there was no blood in the stool. Next day the improvement continued, but she vomited two *Ascaris lumbricoides*. At about 8.30 a.m. on the 8th I was informed that the patient had suddenly collapsed. On examination she was found to be semicomatose with a marked ketosis. Blood was sent for estimation of the sugar content, and a catheter specimen of urine for examination. Insulin therapy was immediately instituted, 60 units of the soluble product, of doubtful potency, being given intramuscularly, as the intravenous route was impossible owing to collapse. Nevertheless, the patient's condition continued to deteriorate and she died at 7.30 p.m. The blood sugar was 380 mg. per 100 ml., and the urine was loaded with albumin, sugar, and ketones.

Necropsy was performed at 2.30 p.m. on March 9; the report was as follows: "The body was that of a fat woman of average build. Rigor mortis was absent. The peritoneal cavity contained about 4 oz. (114 ml.) of blood-stained fluid; there was no evidence of fat necrosis. Liver: size normal; rather fatty. Gall-bladder: size normal; contained six faceted pigment stones. Spleen: normal. Kidneys: both intensely congested and haemorrhagic. Suprarenals: congested. Pancreas: size normal; generally congested; the tail was very intensely haemorrhagic. Stomach: very congested; mucous membrane eroded and, in places, desquamated; no perforation. Bowel: congested only; no perforation. Bladder: normal; contained about 2 oz. (57 ml.) of turbid urine which, on examination, showed copious albumin, sugar, ketones, and blood—microscopically there were numerous erythrocytes and epithelial cells. Pleural cavities: normal. Lungs: normal. Pericardial sac: normal. Heart: somewhat flabby; otherwise normal." Samples of pancreas, kidney, liver, and suprarenals could not be examined histologically, as facilities did not exist.

COMMENTARY

This seems to be a clear case of poisoning by zinc sulphate. Treatment of the original collapse was successful, and progress was well maintained until the fifth day, when hyperglycaemic coma developed. Unfortunately the circumstances precluded daily examination of the urine, otherwise pancreatic insufficiency and renal damage might have been noted earlier. Nevertheless, twelve hours before the onset of coma no premonitory symptoms or clinical signs of hyperglycaemia were observed. It is regrettable that histological examination of the tissues mentioned could not be carried out, but in view of the gross pathological findings at necropsy I feel that this case should be regarded as one of haemorrhagic pancreatitis and widespread renal damage as a result of poisoning by zinc sulphate, with hyperglycaemic coma and death supervening on the fifth day.

My thanks are due to Major S. N. Mittra, I.A.M.C., who carried out the post-mortem examination.

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Post-partum Intra-abdominal Separation of Uterus

The following report of what must be a very rare condition may be of interest.

CASE HISTORY

On March 28, 1946, at 10 a.m., a primiparous European woman of medium build, 25 years of age, spontaneously gave birth to a male child of 8 lb. (3.6 kg.), after having been in labour for 8½ hours, a nurse only attending to her at home. No difficulties were experienced during this stage of the confinement; the placenta, however, appeared to be adherent, and all attempts by the nurse to expel it proved fruitless. It is stated that the patient had some diffuse haemorrhage, but no clots were passed. At 12.30 p.m. (2½ hours after being confined) the doctor was called, and he is alleged to have given her three injections: first 0.5 ml. ergometrine subcutaneously, then 10 ml. calcium gluconate intravenously, and half an hour afterwards a second 0.5 ml. ergometrine subcutaneously. The patient claimed that the doctor did not attempt to expel the placenta, nor did he examine her abdomen or make any other examination. Her condition continued to deteriorate, and she was admitted to the Germiston Hospital at 5 p.m. (seven hours after confinement). On admission she was in a state of collapse, with a feeble pulse and a blood pressure of 60/20 mm. Hg. She was very anaemic and somewhat restless, and there was a slight continuous ooze of bright red blood. The uterus was in a state of contraction. Pressure on the abdomen was resented. A blood transfusion of 1,000 ml. of whole blood was given, followed by 1,000 ml. of serum.

Operation.—At 11 p.m. the patient's condition was considered sufficiently improved to attempt a manual removal of the placenta, and the operation was performed by a house-surgeon, with the patient under a general anaesthetic. After having worked for twenty-five minutes he discovered omentum at the vulva. At this stage a further 1,000 ml. of whole blood was being transfused, although there was no excessive haemorrhage during this operation. I was then called into consultation, and was able to open the abdomen twenty minutes after the discovery of omentum in the introitus. To my surprise I found the uterus completely severed: not a tag connecting uterus and host remained. Apart from a fair amount of blood in the abdominal cavity, only three relatively

small bleeding points were found—one on either side in the round ligaments of the ovaries, and a third in the right uterine fold—which were clamped and ligatured. The uterine arteries could not be seen, nor was there any retroperitoneal haemorrhage. The stretched cervix was torn through and severed from the body of the uterus, with a fair-sized flap of peritoneum anteriorly. The broad bands with round ligaments of uterus and ovaries presented a continuous flap on either side; the Fallopian tubes, however, were torn off separately. Both ovaries were intact. There was no damage found on any of the adjoining viscera or ureters. With some reluctance it was decided not to look for the uterine arteries, as there was no sign of haemorrhage from them. The condition of the patient was somewhat precarious, and ligating these arteries would also have involved

Photograph of the uterus, showing the protruding umbilical cord and placenta, and the attached pieces of the uterine arteries.

ligating a major branch of the internal iliac artery. Very little trimming of the cervix stump was necessary. It was stitched, peritonealized, and the wound closed. The operation lasted about thirty minutes.

Her recovery was uneventful. She received penicillin (20,000 units three-hourly) and sulphadiazine (2 tablets four-hourly) with mist. pot. cit. for the first four post-operative days. During these four days she had to be catheterized, after which she passed urine spontaneously. On the third post-operative day her blood pressure was 130/80 mm. Hg, and her temperature, which showed a slight elevation (102° F.: 38.9° C.), settled to normal on the fourth day. She was discharged from hospital on the seventeenth day. On April 29 (one month after operation), when I last examined her, she enjoyed excellent health, and was apparently no worse for the loss of her uterus.

The specimen consisted of a contracted uterus with the placenta *in situ*, a few inches of umbilical cord and a bit of placenta protruding. On examination the placenta did not appear to be adherent. The circular tear went through the stretched cervix near the body of the uterus. Anteriorly the specimen was largely stripped from its peritoneum, while posteriorly the serosa was left intact. Both sides of the specimen showed tags of ligamentous tissue derived from the round ligaments of uterus and ovaries. Small ends of the Fallopian tubes were also left intact. Long pieces of the uterine arteries were attached to the specimen 3½ in. (8.9 cm.) on the right side and 2½ in. (7 cm.) on the left side, apparently torn off at their origins from the internal iliac arteries (see Fig.).

COMMENT

This patient made a definite statement that prior to 11 p.m. on the day of her confinement she had not had an anaesthetic, nor had she been examined per vaginam either by the nurse or by the doctor, yet there had been diffuse bleeding to account for her collapsed condition. The ergometrine injected at 12.30 p.m. and 1 p.m. respectively apparently accounted for the contracted state of the uterus. One may ask, Was there a uterine tear prior to the house-surgeon's operation, and, if so, how had it happened? Is it possible to cause a uterine tear by exercising abdominal pressure, or by Credé's method of expelling the placenta? Whatever the answer may be, the patient's survival after such a gross lesion must be without parallel.

Germiston, Transvaal, S. Africa.

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