intubation is necessary or desirable C10 facilitates the passage of a Magill intratracheal tube without producing complete abdominal relaxation, which is so often unnecessary in E.N.T., orthopaedic, and other classes of operation.

It may be used in conjunction with D-tubocurarine chloride to produce short-term relaxation of the abdominal muscles when the peritoneum is being closed and it is undesirable to give another dose of D-tubocurarine chloride because of its long action and cumulative effect. Full respiratory excursions will then be established before the patient returns to the ward.

Antagonist.—Pentamethonium iodide, or C5, is the antidote to C10. Hewer *et al.* (1949) have reported its effects. It acts by producing a block of the autonomic ganglia, and would seem to be contraindicated in major surgery. It may produce a profound fall in blood pressure, and the patient may collapse in a very alarming manner. No opportunity has arisen and no attempt been made to use this substance here.

My thanks are due to Dr. T. H. Hobbes, the senior anaesthetist, for his help.

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Medical Memoranda

Volvulus of the Small Intestine

The following case illustrates the difficulty of diagnosis of volvulus of the small intestine. This difficulty is present not only before operation but when the abdomen has been opened. The aetiology of the condition is obscure, and in the case described an adhesion was present round which the gut appeared to have pivoted. This has been described in other cases, but the operator is likely to find no obvious cause whatever.

CASE REPORT

A storekeeper aged 53 was admitted to hospital complaining of acute abdominal pain 1 in. (2.5 cm.) to the left of the umbilicus two days previously. Before this he had always been quite well. There was continuous dull abdominal pain with exacerbations of acute colic. The bowels had been absolutely confined and no flatus passed. Vomiting began a few hours after the onset of pain and had continued.

On admission he had an ashen appearance. His tongue was dry and furred. His temperature and pulse were normal. The abdomen was tympanitic and a little distended but with no real rigidity. No free fluid was discovered and there were no localizing signs of any sort to assist diagnosis. He was vomiting brownish fluid but there was no faecal change in the vomit. Enemas were returned unchanged. Borborygmi were heard over the large intestine. A diagnosis was made of small-bowel obstruction probably due to strangulation by band or internal hernia.

At operation there was a little free fluid and the whole small intestine presented moderately distended and markedly congested but not "plum coloured." In the left hypochondrium a band 3/16 in. (0.5 cm.) in diameter and extending from the splenic flexure downwards and inwards was found to be attached to the middle of the mesentery. This band was part of numerous adhesions tying the whole colon from caecum to sigmoid to the anterior peritoneum. The small intestine was free of adhesions. The large intestine was moderately and normally distended. Round the band was wrapped a loop of small intestine which was more obviously affected than the rest, as it was plum coloured and more distended. The band was divided and the small loop began to recover in appearance. At first it was thought that the cause of the obstruction had been discovered and dealt with, but the poor condition of the whole small intestine raised doubts, and, on feeling round the abdomen, the typical "band" caused by the twisted mesenteric root was felt and the volvulus diagnosed. The small intestine was eventrated, the 180-degrees twist that was present was untwisted, and the abdomen closed. The patient made an uninterrupted recovery.

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Aplastic Anaemia Complicating Miliary Tuberculosis

In the following case complete aplasia of the bone marrow developed. This seems to be an unusual complication and the clinical findings are worth recording.

CASE REPORT

The patient, a man aged 41, was healthy until March, 1949. His initial symptoms were non-specific—namely, lassitude, anorexia, and headaches. In June, 1949, he had a severe epistaxis and bleeding from the gums. He was admitted to hospital on August 4. There was no family history of tuberculosis.

On examination he was obviously very ill. He complained of a sore throat. The fauces were injected but not ulcerated. Pallor was pronounced without any evidence of icterus. The superficial lymphatic glands were not enlarged. His temperature was 101.6° F. (38.7° C.) on admission, and a remittent pyrexia, fluctuating between 100 and 103.2° F. (37.8 and 39.6° C.), persisted until the day before death. The pulse was 120. A loud systolic murmur was audible at the mitral area. The blood pressure was 145/80. No abnormal signs were elicited in the lungs. The spleen was enlarged to ½ in. (1.2 cm.) below the umbilicus, and the liver was enlarged 2 in. (5 cm.) below the costal margin.

The urine was normal. A blood count showed: haemoglobin, 36%; red cells, 1,510,000; C.I., 1.2; white cells, 1,200. No primitive cells were seen in the film. The red cells showed anisocytosis and poikilocytosis. Aerobic blood culture was negative. Examination of the sternal marrow smears revealed no primitive cells of either the myeloid or erythrocyte series. The film was diagnostic of aplasia of the bone marrow.

A radiograph of the chest showed a resolving area of consolidation in the left mid-zone. The remainder of the lung fields was clear. There was no enlargement of the mediastinal lymph nodes and no mottling. The patient died on August 21, 17 days after admission.

Permission for a necropsy could not be obtained, but the spleen was removed. This viscus was grossly enlarged and the histological examination showed multiple areas of necrosis with a slight mononuclear reaction around the margins. With Ziehl-Neelsen's stain lesions were seen to contain acid-fast bacilli. The picture was that of an atypical miliary tuberculosis.

COMMENT

There are several features of unusual interest in this case. Aplasia of the bone marrow was caused by an overwhelming toxaemia with a very low resistance. The absence of chest symptoms and minimal radiological findings are very difficult to explain in a case of generalized miliary tuberculosis. The primary focus was probably extrapulmonary. The gross splenomegaly was due to numerous tubercles and there was no evidence of splenic panhaematopenia. The miliary tuberculosis was not seriously considered in the differential diagnosis. Aleukaemic leukaemia was excluded by the marrow findings.

Septicaemia due to an anaerobic organism was the tentative diagnosis.

My thanks are due to Professor J. H. Biggart for his report on the histological section of the spleen, to Dr. M. G. Nelson for the report on the marrow smears, to Dr. C. R. Murdock for the report on the blood, and to Dr. H. B. McDowell for the report on the radiographs.

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Treatment of Typhoid Carrier with Penicillin and Sulphamerazine

The successful treatment of a typhoid carrier, who had resisted combined sulphonamide–penicillin and caronamide, and choramphenicol, was eventually achieved by sulphamerazine and penicillin in dosage similar to that employed in our earlier case (Rumball and Moore, 1949).

CASE REPORT

A boy aged 9 contracted typhoid fever in Egypt in July, 1948, and came under our care six months later as a chronic persistent and profuse faecal carrier. His agglutinations were: typhoid O, 1 in 20; typhoid H, 1 in 250; and typhoid Vi, 1 in 10 standard agglutination and 1 in 20 partial agglutination. *In vitro* sensitivity tests showed: sulphathiazole—insensitive at 25 mg. per 100 ml., sensitive at 50 mg.; penicillin—insensitive at 1 unit per ml., sensitive at 5 units; sulphathiazole and penicillin combined—no demonstrable increase in sensitivity.

Over a period of nine days beginning on February 12, 1949, 19,000,000 units of crystalline penicillin, 75 g. of caronamide, and 39.75 g. of sulphatriad were given. Serum penicillin assay showed a range of 0.08 to 0.3 unit per ml., and sulphonamide concentration from 9.2 to 18 mg. per 100 ml., these levels being obtained immediately before the four-hourly doses of the combined drugs. A scanty growth of *Salmonella typhi* continued throughout treatment, but a profuse growth returned within a few days afterwards, even though the patient's serum on February 18 had inhibited the isolated organism.

Chloramphenicol was considered as a second method of treatment, based on the findings of Smadel *et al.* (1948), Woodward *et al.* (1948), and Murgatroyd (1949) that this drug was active in the acute disease, though at the time no literature was available regarding its effectiveness against the carrier state. The isolated organism was found to be extremely sensitive *in vitro* to chloramphenicol at a dilution of 2.5 mg. per ml. A course of treatment, using 0.25 g. of chloramphenicol four-hourly for seven days, to a total of 10.5 g., was therefore given from April 12 to 18. This dosage, equivalent to 10 mg. per kg. body weight, was based on half the adult dose given in acute cases. Positive stool cultures were obtained consistently during and after this course. A further course, using a threefold increase in dose to a total of 32.25 g., was given from April 25 to May 2, and was also unsuccessful. During the latter course serum sensitivity levels from 0.02 to 0.04 mg. of chloramphenicol per ml. were obtained, and faeces were negative. Apparently inhibition of the organism occurred while there was a high concentration of the drug in the bowel, but with the cessation of treatment the organism reappeared in profusion. In view of the outbreak of typhoid fever in Crowthorne, Berkshire, at the time (April, 1949) the unsuccessful use of the drug in this particular carrier was regarded as an important though disappointing clinical result.

Finally a 10-day course of 29.5 g. of sulphamerazine and 32,200,000 units of penicillin, comparable to that successful in our earlier case, was given in May, during which serum penicillin levels rose to 1 unit per ml., sulphamerazine concentration ranged from 15.8 to 36 mg. per 100 ml., and the patient's serum inhibited the organism in dilutions of 1 in 16. Faeces became negative early in this course of treatment and have remained negative consistently throughout the nine months' follow-up. The Vi titre had also returned to negative. Cure is therefore presumed probable.

COMMENT

It is stressed that cure of a second case with this method warrants no special claim being made of its superior value over other reported successful methods of treatment, but this case again serves to impress the fact that high and sustained blood levels are essential for success. In this case repeated failure with other methods, and success with the third course of treatment, may also be explained on the findings of Fry *et al.* (1948) that intermittent courses of treatment may be more successful than a continuous attack. The advent of chloramphenicol has considerably reduced the clinical complications and hastened recovery in acute cases of typhoid, in which the organism is more accessible to its action, but the treatment of the carrier state is a very different problem. Before abandoning hope in the treatment of carriers it is considered that the combined use of penicillin and sulphamerazine is worth a trial.

Since submitting this article a chronic urinary and faecal carrier of *Salmonella kottbus* has come under our care. Treatment similar to that detailed above was successful. *Salm. kottbus* belongs to the food-poisoning group of organisms. A summary of the case history is appended.

A 21-year-old aircraft hand was notified to us from a military hospital, to which he was admitted in December, 1949, suffering from diarrhoea and vomiting. His stools and urine gave a pure growth of *Salm. kottbus*. He was transferred to our care on January 31, 1950, symptomless and well. The organism was isolated and found to be sensitive to chloramphenicol, and a course of 25 g. was given. Subsequent cultures showed that the urinary infection had been eradicated, but the bowel infection persisted. At the end of February he was given a seven-day course of penicillin, 400,000 units four-hourly, night and day, together with a course of 27 g. of sulphamerazine. On completion of this the faeces were free from *Salm. kottbus*. He has remained under bacteriological surveillance, and during the three months since completing treatment both stools and urine remain free from *Salm. kottbus* infection. This case demonstrates the susceptibility of urinary infection to chloramphenicol and the resistance of bowel infection, which, however, responded to combined sulphamerazine and penicillin.

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The British Standards Institution has issued a draft British Standard for linen textiles for use by local authorities and hospitals. The draft is being circulated to interested organizations so that they may comment on it before August 15. It is based on proposals made by the Local Authority Standards Advisory Committee in collaboration with the Hospital Equipment Standards Advisory Committee.