Summary

The mass treatment with piperazine adipate of all the children aged 1 to 14 years on one of the Shetland Isles is described. The object was to rid them of threadworms. A total of 194 children were treated.

A sample group of 50 children were examined by anal swabs, and their mothers questioned about their symptoms, before and after treatment. Before treatment 32 were found to be infested with threadworms. Two weeks after treatment all 30 who completed the course were free of infestation. Six months later 20 had become reinfested, but one month after a second course of treatment all were again free. There was also amelioration in symptoms, generally ascribed to threadworm infestation, with the notable exception of enuresis.

Side-effects of treatment were few and unimportant.

It is concluded that mass treatment with piperazine adipate is effective in eradicating threadworm infestation in a community of children, but to prevent relapse parents, especially the mothers, must be treated at the same time.

My thanks are due to Dr. S. A. B. Black, medical officer of Health for Zetland, for his advice and encouragement; to Nurse Cowie, who helped to distribute the piperazine adipate; to the headmasters of Livister Primary School and Brough Secondary School for their willing co-operation; and to British Drug Houses Ltd., who generously supplied, free, the large amount of piperazine adipate required in the form of "entacyl" tablets. My thanks are also due to the mothers and children of the sample group who conducted, and submitted to, the numerous tedious and embarrassing swabbings which were necessary.

REFERENCES

- Mouriquand, G., Roman, E., and Coisnard, J. (1951). *J. méd. Lyon.*, 32, 189.
Standen, O. D. (1953). *British Medical Journal*, 2, 757.
Turpin, R., Cavier, R., and Savaton-Pillet, J. (1952). *Thérapie*, 7, 108.
White, R. H. R., and Standen, O. D. (1953). *British Medical Journal*, 2, 755.

WHIPWORM INFECTIONS TRIAL OF FOUR PIPERAZINE COMPOUNDS

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A simple satisfactory treatment for *Trichuris trichiura* (whipworm) infections in man has yet to be found. Some success in apparently light infections has been obtained with hexylresorcinol enemata and papain (Jung, 1954; MacCarthy, 1954). The worm is seldom said to give rise to severe symptoms, but if a safe and easily administered drug is found to be effective against some intestinal helminths it should be tried against *T. trichiura* also. It was noted that the ova of this worm appeared irregularly in the stools in light infections, so a comparison of a quantitative nature in groups of patients was thought more likely to give a reliable indication of the efficacy of a drug than qualitative comparisons in individual patients.

The piperazine compounds are very safe and effective against roundworms and threadworms. A trial of piperazine hydrate and adipate against *T. trichiura* infections in children has been reported from Australia by

Dunn (1955), who found that the hydrate, in a dosage of 75 mg. per kg. of body weight daily for three days, cleared only 4 out of 22 (18%) children of ova; but he found the adipate cleared 28 out of 31 (90%) children of ova in dosage of 300 mg. per year of age, to a maximum of 1,800 mg. daily for three days. An opportunity to study the adipate again, and also to try other piperazine compounds, occurred in the autumn of 1955, when news was received of heavy *T. trichiura* infections among patients at a hospital for mental deficiency. An account of the clinical aspects of these is under preparation by one of us (A.G.H.). The therapeutic trial of four piperazine compounds is reported here—the phosphate, citrate, sebacate, and adipate.

Details of Trial

The patients were divided into four groups, each of 20 individuals, and all members of each group were given one of the drugs. Most of the patients were boys aged 7 and upwards, but four were adults. The stools of all the patients in each group were collected just before treatment and the number of eggs per gramme was estimated by a modification (Caldwell and Caldwell, 1926) of the Stoll method using sugar solution. We are indebted to Mr. F. R. N. Pester, of the Helminthology Department, London School of Hygiene and Tropical Medicine, and Mr. K. A. Fuller, of the Wellcome Laboratories of Tropical Medicine, for undertaking the egg counts. For the phosphate, citrate, and sebacate the dosage given was equivalent to 500 mg. of piperazine hexahydrate three times daily for seven days in all cases. The dosage of the adipate was 600 mg. (equivalent to 502 mg. of hexahydrate) three times daily for seven days. No other measures, such as starvation or purgatives, were employed. No side-effects of the drugs were noted. Two weeks after the completion of the course of treatment the stools were again collected and examined by the same observer as had examined them previously. The observers were kept in ignorance of the nature of the preparation administered to each group.

In the stools of three patients there were ova after, but not before, treatment; and in the stools of one patient there were ova before, but not after, treatment. High egg counts, up to 75,000 per gramme of faeces, were found in some cases. The difference between the number of eggs per gramme of faeces before and after treatment was calculated for each patient. In some, especially those with comparatively light infections, large differences were noted, but these tended to cancel each other out when the mean difference for each group was calculated.

Details of Four Groups

Group	Compound of Piperazine	No. of Infected Patients	Mean Egg Count per g. Faeces before Treatment	Mean Difference in Egg Count after Treatment	Standard Error of Difference	t	P
I	Phosphate	17	4,400	+1,315	±686	+1.92	0.1-0.05
II	Sebacate	17	6,600	-2,176	±2,593	-0.84	0.4
III	Adipate	18	3,900	-367	±478	-0.77	0.4-0.5
IV	Citrate	18	10,400	+456	±602	+0.76	0.4-0.5

The mean difference for each group and its standard error are shown in the Table. The application of "Student's" t test to these figures shows that none of the means was significantly different from zero. None of the compounds of piperazine, tested in doses which are effective against *Ascaris lumbricoides* and *Enterobius vermicularis*, had any action on *T. trichiura*.

Summary

A trial of the therapeutic effects of four piperazine compounds—the phosphate, sebacate, adipate, and

citrate—administered by mouth was carried out among patients heavily infected with *T. trichiura*. No therapeutic effect was observed.

We wish to thank Dr. H. E. Beasley, physician-superintendent, for his encouragement and permission to undertake the investigation, and the nursing staff of the hospital concerned for their co-operation. Brigadier J. S. K. Boyd, of the Wellcome Laboratories of Tropical Medicine, kindly supplied the drugs used, and Mr. O. D. Standen and Dr. L. G. Goodwin, of the same laboratories, have been very helpful in the preparation of the paper.

REFERENCES

- Caldwell, F. C., and Caldwell, E. L. (1926). *Amer. J. Hyg.*, 6, Suppl. 146.
Dunn, T. L. (1955). *Lancet*, 1, 592.
Jung, R. C. (1954). *Amer. J. trop. Med. Hyg.*, 3, 918.
MacCarthy, E. (1954). *Lancet*, 1, 436.

Medical Memoranda

Torsion of the Gall-bladder

About a hundred cases of acute torsion of the gall-bladder have been reported in the literature since Wendel's case (1898). From the Scandinavian countries single cases have been reported by Hansen (1920), Arnesen (1929), Koch (1943), Ekdahl (1951), and Berg (1955). It is rare for one surgeon to see more than one of these cases during his lifetime; yet four surgeons have seen two cases and one surgeon has seen three. The latter is of the opinion that a correct pre-operative diagnosis is possible. To make the gall-bladder capable of undergoing torsion it must either have a complete mesentery or its body be free, the mesentery only fixing its neck. This state of affairs is brought about either as a congenital anomaly or as an acquired relaxation, atrophy of the connective tissue permitting increased ptosis of the gall-bladder (Maingot, 1948).

Detailed reviews of published cases have been made by Short and Paul (1934) and Bean and Symond (1953). A further case is here presented.

CASE REPORT

A 70-year-old woman was admitted to Surgical Department A of Frederiksberg Hospital at 9.30 p.m. on July 4, 1953, with a twelve-hours history of acute diffuse pain in the abdomen, later localized to the right iliac fossa. The pain was of a constant character with colicky exacerbations, and she vomited several times. There had been a normal motion twelve hours before, but no flatus had been passed since.

On examination she was noted to be a rather fat ill-looking old lady obviously in pain. Her tongue was dry, temperature 99.6° F. (37.5° C.), pulse 100, and regular. The abdomen was large with a slightly prominent right side; there was no abdominal distension, but a tender mass was felt in the right iliac fossa in the area between the iliac crest and a scar from a right pararectal incision (appendicectomy). Pelvic and rectal examination gave no information. With a provisional diagnosis of intestinal obstruction, possibly caused by a caecal tumour or a caecal torsion, a straight x-ray film of the abdomen was taken, followed by a radiograph of the colon after a barium enema. No signs of obstruction were found, but it was noted that the hepatic flexure of the colon was placed lower than usual. With the application of local heat, and fasting, the patient was observed for some hours. The temperature rose to 101.2° F. (38.4° C.), and the abdomen became slightly distended. It was noted that the tender mass in the right iliac fossa shifted somewhat in position and size. A renewed straight x-ray film of the abdomen showed some air in the small bowel but no fluid levels. At this juncture the possibility of an acute obstructive cholecystitis was discussed, but as no definite diagnosis had been reached it was decided to operate.

A laparotomy was performed through a right transrectal incision medial to the old scar. On opening the peritoneum

a moderate amount of fluid was noted, and some adhesions had to be cut. A heavy, reddish-black gangrenous gall-bladder 20 cm. long presented itself in the wound, being suspended from the liver by a small partial mesentery. It had undergone a 360-degrees anticlockwise torsion. After untwisting and isolation and ligation of the cystic duct and artery, the gall-bladder was easily removed. The wound was closed in layers with a drainage tube to the gall-bladder bed. The patient made an uneventful recovery.

The removed gall-bladder contained numerous small gall-stones, and microscopical examination showed a haemorrhagic necrosis of its wall.

COMMENT

If an old woman is seized by a sudden colicky pain of persisting character in the middle of the abdomen, right hypochondrium, or right iliac fossa, a diagnosis of gall-bladder torsion may be considered. In some cases there is a distinct zone of maximal tenderness over a small area, as pointed out by Case (1951) and Bell (1955). Furthermore, if a tender rounded tumour is found, varying in size during observation, it should be possible to arrive at the correct pre-operative diagnosis—namely, torsion of the gall-bladder. The treatment is early cholecystectomy.

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REFERENCES

- Arnesen, A. J. A. (1929). Cited by Ekdahl (1951).
Bean, L. L., and Symond, D. A. (1953). *U.S. armed Forces med. J.*, 4, 411.
Bell, D. M. (1955). *British Medical Journal*, 1, 29.
Berg, E. (1955). *Nord. Med.*, 53, 997.
Case, T. C. (1951). *Amer. J. Surg.*, 82, 749.
Ekdahl, S. E. (1951). *Nord. Med.*, 46, 1796.
Hansen, P. N. (1920). *Dansk Kir. Selsk. Forh.*, p. 23.
Koch, F. (1943). *Nord. Med.*, 18, 1087.
Maingot, R. (1948). *Abdominal Operations*, 2nd ed. London.
Short, A. R., and Paul, R. G. (1934). *Brit. J. Surg.*, 22, 301.
Wendel, A. V. (1898). *Ann. Surg.*, 27, 199.

Combined Congenital Malformations of Oesophagus and Heart

It is well known that more than one congenital malformation may occur in the same patient, and that certain malformations are commonly associated together. A better knowledge of such definite combinations might help both in diagnosis and in the understanding of the causative factors. The following case had congenital malformations affecting both the oesophagus and the heart.

CASE REPORT

A 19-year-old primipara, with a normal history of pregnancy when seen at the antenatal clinic, was delivered of a severely anoxic male infant on December 21, 1954. Labour was normal, but hydramnios was present. The infant weighed 5 lb. 6 oz. (2,450 g.). In spite of repeated careful aspiration there was a continuous and copious discharge of mucus from the mouth and nose. At six hours, examination showed a deeply cyanosed infant with rattling respiration, from whose nose and mouth clear mucus was still discharging. Loud rhonchi were heard over the chest, and a loud systolic murmur maximal at the apex of the heart. An unsuccessful attempt was made to pass a tube into the stomach, and the infant died, anoxic and very deeply cyanosed, 63 hours after birth. A post-mortem radiograph showed that the upper oesophageal segment ended as a blind pouch, while the lower oesophageal segment communicated at its upper end with the bifurcation of the trachea.

Extract from Necropsy Report.—The oesophagus ended in a blind sac-like enlargement 3 cm. from its proximal end. At the point of its bifurcation the trachea communicated with the distal portion of the oesophagus, which had a diameter of 6 mm. and ended normally in the stomach. The heart was enlarged, the right ventricle being dilated and hypertrophied. The left ventricle was smaller, with thinner walls than usual. The aorta and pulmonary artery