causes of patients giving up long-term therapy in his series was that of expense and trouble. Under the National Health Service of Great Britain and Northern Ireland direct cost to the patient is not, of course, a selective factor. A heavy burden will also be thrown on the general practitioner, which was not envisaged when the capitation rate was struck, and it is a burden which will snowball as the years pass: the more successful the treatment the more patients will survive to require it.

Further, if the treatment is to be extended to every case which might benefit thereby as regards prolongation of life, regardless of age or capacity for work or ability to care for himself, the number of cases might be expected to increase threefold or fourfold, as not only would older cardiac infarcts become eligible, but also cases of intermittent claudication, pulmonary emboli, arterial embolism, recurrent thrombophlebitis, and auricular fibrillation. The latter might be included with advantage now in the case of younger people. Much increased laboratory facilities would therefore have to be provided. At present it is often a very difficult decision whether to start a particular case on long-term treatment, and, once started, whether to continue indefinitely. If further experience shows that it is almost as dangerous to stop long-term anticoagulants as never to begin, it will then be necessary to carry on indefinitely or until there is some strong indication for stopping.

While the present series is too small for any statistical conclusions, the results tend to agree with the favourable response reported by other writers. Ten men and two women had at least one attack of coronary infarction each in the past three years. No fresh attacks have occurred during anticoagulant treatment, though three of the cases have had at least one relapse before beginning long-term anticoagulant therapy in a shorter period of time than they have been under treatment.

Summary

The many favourable reports on long-term anti-coagulant therapy in coronary thrombosis coming from hospital and consultant practice are reviewed. Their multiplicity is in sharp contrast to the paucity of reports of similar treatment by general practitioners.

The experiences of a general practitioner in providing long-term anticoagulant therapy for 12 cases of proved coronary thrombosis are described. The period of treatment varied from 3 to 33 months and is still continuing. There had been no mortality at the time of writing. Indications, contraindications, precautions, and difficulties peculiar to general practice are outlined, and ethical and other problems in the selection of cases are discussed.

I am indebted to my partner, Dr. T. M. Hanna, my wife, Dr. Sandra Wylie, and Miss M. Gilmore for their practical and clerical assistance; to Dr. C. R. Murdock, the Central Laboratory Northern Ireland Hospitals' Authority, for doing the prothrombin tests; to the East Antrim Hospitals' Management Committee for its co-operation in the transportation of specimens; and to Dr. E. A. Cheeseman for his advice on statistics.

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MESENTERIC ADENITIS IN ASSOCIATION WITH ASCARIASIS

BY

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Hyperinfestation of the intestine with roundworms (*Ascaris lumbricoides*) is common in tropical climates and is due predominantly to low socio-economic and cultural levels. The clinical syndromes produced by hyperinfestation are many and varied, and the surgical complications of ascariasis, though perhaps less well known, include intestinal obstruction, perforation, and peritonitis, particularly in children (Ochsner *et al.*, 1949; de Silva, 1957).

In a case of intestinal obstruction due to roundworms it was noticed that the visceral peritoneum was lightly covered with a sticky yellowish fluid, and in five subsequent cases, the histories of which are given below, a similar fluid in the peritoneum was accompanied by hyperinfestation of the intestine with roundworms and well-marked mesenteric adenitis. This combination of lesions has not been described previously in the available literature.

Case 1

A boy aged 13 was admitted to hospital because of right-sided colicky abdominal pain of two days' duration. He had been treated for worms with Ayurvedic (native) medicines shortly after the onset of symptoms, but this had only increased the pain. He had not vomited, nor did he complain of nausea, but he had been constipated for three days. There were no other symptoms, nor had there been a history of similar attacks in the past.

On examination he was in good condition; his temperature was 98° F. (36.7° C.) and pulse rate 88 a minute. The lymph nodes were not enlarged. The abdomen was slightly distended, with guarding and marked tenderness in the right iliac fossa. There was tenderness also in the recto-vesical pouch on rectal examination. A

provisional diagnosis of appendicitis was made. At operation through a right paramedian incision a small quantity of sticky yellowish fluid was found in the peritoneal cavity. The appendix appeared normal, but there were between 60 and 75 roundworms in the lower ileum. The glands in the mesentery were enlarged, fleshy, oedematous, and pink. Appendicectomy was performed and a lymph node taken for biopsy; the peritoneal fluid was also taken for bacteriological examination. The wound was closed without drainage.

His temperature was 100° F. (37.8° C.) on the day after operation; it fell by lysis to normal on the fifth day and thereafter remained normal. (No antibiotics were used.) A single dose of 1 oz. (30 g.) of piperazine citrate was administered after 48 hours, but his bowels were not opened till the fifth day, when several large roundworms were passed with the stools. The white-cell count (on the morning after operation) was 12,500, with a normal differential count.

Microscopical examination of the appendix showed marked lymphoid hyperplasia, while that of the lymph node showed reactive hyperplasia with a few eosinophils in the sinuses. The peritoneal fluid contained polymorphonuclear leucocytes, but was sterile.

Case 2

A woman aged 41 gave a history of severe colicky abdominal pain of seven hours' duration. The pain was worst to the right of the umbilicus. She had had nausea from the time of the onset of the pain but had not vomited. Her bowels had not been opened for over 24 hours, and there had been no passage of flatus since the pain had begun. She complained of "feeling obstructed." There were no other symptoms and she could not remember having had a similar attack of pain.

On examination she appeared to have attacks of pain at intervals of about 10 minutes, but her general condition was good; pulse rate was 82 and temperature 98.6° F. (37° C.). There was slight distension of the abdomen, with marked guarding and tenderness to the right of the umbilicus. (Within this area the point of maximal tenderness varied from time to time.) Vigorous bowel sounds were heard on auscultation. Rectal examination was negative and plain films of the abdomen failed to demonstrate any evidence of obstruction. A provisional diagnosis of acute appendicitis was made.

At laparotomy a small amount of fluid was lightly covering the intestine; it was sticky and yellowish in colour. There were over 50 roundworms in the lower ileum, and the small intestine showed alternative areas of segmental spasm. The mesenteric nodes were enlarged, fleshy, and pink. The appendix appeared normal, but was removed. Biopsy specimens were taken of a lymph node and the omentum, and the wound was closed without drainage.

She had a pyrexia of 99° F. (37.2° C.) for three days and then remained apyrexial. She was given 1 oz. (30 g.) of piperazine citrate on the evening of the third post-operative day and passed several roundworms with her stools the next morning. (No antibiotics were used.) The white-cell count (on the morning after operation) was 13,000, with a normal differential count.

Microscopical examination showed an uninfamed appendix with roundworm ova and calcified concretions in the lumen; the lymph node showed reactive hyperplasia, "sinus catarrh"; and the omentum was hyperaemic and congested. The peritoneal fluid contained polymorphonuclear leucocytes and was sterile.

Case 3

A man aged 32 first had "gripping" pain in the central abdomen three days previous to being seen. It had continued intermittently and had become progressively worse. He had vomited twice, bringing up bitter yellowish fluid, and had been constipated for three days. He had

noticed a loss of appetite over the preceding three months but had had no other symptoms. A history of a similar attack five years ago was obtained; central abdominal pain, vomiting, and constipation had been the symptoms then.

On examination his general condition was good; temperature 98.4° F. (36.9° C.) and pulse rate 88. There was moderate distension of the lower abdomen, with tenderness and guarding to the right of and somewhat below the umbilicus. (The point of maximal tenderness was inconstant, but was confined to the same area.) Rectal examination was negative and a plain radiograph of the abdomen failed to show any evidence of intestinal obstruction. A provisional diagnosis of acute appendicitis was made. At laparotomy the mesenteric glands were enlarged, fleshy, and pink. The intestines were covered with a sticky yellowish fluid and contained about 75 roundworms, the majority in the lower ileum, a few being palpable in the large intestine. There was marked segmental spasm of the small intestine with alternative areas of dilatation. The appendix, a lymph node, and a specimen of the omentum were removed for examination. The wound was closed without drainage.

He had a temperature of about 99° F. (37.2° C.) for six days and then remained afebrile. He was treated for roundworms with 1 oz. (30 g.) of piperazine citrate on the fourth and fifth days, when several roundworms were passed in the stools. On the day after operation the white-cell count was 13,600, with a normal differential count.

Microscopical examination revealed a normal appendix, congestion of the omentum, and marked reactive hyperplasia of the lymph node.

Case 4

A boy aged 15 complained of colicky pain in the central abdomen. The attack had started 36 hours previously, and pain had since increased in severity. It was right-sided, and most severe in the right iliac fossa. He had not vomited, but had complained of nausea. His bowels had not opened for three days, but an enema given shortly before admission had produced some faecal matter containing a large roundworm, about 8 in. (20 cm.) long. The boy had had similar attacks in the past few months and had always been relieved by Ayurvedic remedies for worms except on this occasion.

On examination his general condition was good; his temperature was 99° F. (37.2° C.) and pulse rate 106. The abdomen was not distended, but tenderness and guarding were present to the right of the umbilicus, the point of maximal tenderness being inconstant. Rectal examination was negative. A provisional diagnosis of mesenteric adenitis associated with roundworms was made.

At laparotomy a small amount of clear fluid was found in the peritoneal cavity. The mesenteric nodes of all three groups (juxta-intestinal, intermediate, and terminal) were enlarged, but no worms were palpable in the intestine, which appeared quite normal except for the presence of an uninfamed Meckel's diverticulum. The latter was excised, the appendix was removed, and specimens of the lymph nodes and omentum were taken for biopsy. The wound was closed without drainage.

The patient had a pyrexia of about 100° F. (37.8° C.) for three days. No antibiotics or anthelmintics were given, and he made an uneventful recovery. The white-cell count was 13,200, with a normal differential count, and the stools did not contain any ova or worms. The peritoneal fluid was sterile.

Microscopical examination revealed reactive hyperplasia of the lymph nodes and marked hyperplasia of the lymphoid follicles of the appendix. There was no abnormality of the omentum or the Meckel's diverticulum.

Case 5

A schoolboy aged 16 complained of colicky pain in the right iliac fossa. The pain had started 12 hours previously

and had become worse. He had vomited several times, bringing up small quantities of food and bitter fluid. Bowels had not opened for two days. There were no other symptoms, nor was there a history of having passed worms or having been treated for them.

On examination his general condition was good; temperature 99° F. (37.2° C.) and pulse 115. He was noticeably drowsy. The abdomen was slightly distended, and tenderness and guarding were present in the right iliac fossa. (The point of maximal tenderness was inconstant, but was confined to this area.) Rectal examination was negative. A diagnosis of mesenteric adenitis associated with hyperinfestation with roundworms was made.

Laparotomy disclosed a very small quantity of sticky yellow fluid covering the intestine, and about 75 roundworms in the terminal ileum; there was segmental spasm of the small intestine in the region containing the worms. These findings were associated with well-marked (mesenteric) adenitis affecting all three groups of glands in the mesentery. The appendix appeared normal, but was removed. A lymph node and a piece of omentum were taken for biopsy, and the wound was closed without drainage.

He ran an irregular temperature for five days. Piperazine citrate was given on the fifth night and several roundworms were eliminated next morning. Stool examination on the ninth post-operative day was negative for worms and ova. The white-cell count was 15,800, with a normal differential count, on the day after operation.

Microscopical examination of the appendix showed lymphoid hyperplasia with several ascaris ova in the lumen of the organ; there was marked reactive hyperplasia of the lymph node and congestion of the omentum. The peritoneal fluid was sterile and contained polymorphonuclear leucocytes.

Discussion

Incidence.—Girges (1934), in a comprehensive review of the complications of ascariasis, makes no reference to the association between mesenteric adenitis and hyperinfestation of the small intestine with roundworms. The above five cases occurred in my practice in just over one year, and suggest that the condition must be fairly common, especially when it is remembered that children under 12, in whom complications of roundworms are usually much commoner than in the adult, are not admitted to the General Hospital, Colombo, where this work was carried out.

In the first three cases a provisional diagnosis of appendicitis was made before operation. As the clinical pattern did not quite fit in with that of acute appendicitis a laparotomy through a paramedian incision was performed in each case. In Case 4 a history of the evacuation of a roundworm per anum, combined with a clinical similarity to non-specific mesenteric adenitis, suggested the possibility of this association, but operation did not reveal hyperinfestation, owing, perhaps, to the efficacy of the vermifuge taken. In Case 5 the correct diagnosis was made before operation because the physical sign of drowsiness (in the absence of other signs of toxicity) was added to the clinical features of mesenteric adenitis.

In retrospect it is clear that all five cases presented with the clinical features of acute mesenteric adenitis—namely, generalized abdominal colic, nausea or vomiting, constipation, and pain maximal in an ill-defined area on the right side of the abdomen. There was, however, no history of a recent sore throat or other respiratory infection, as is so often obtained

in non-specific mesenteric adenitis. The clinical signs were poorly defined. The temperature was often normal or only slightly raised; the tenderness was usually in the region of the right iliac fossa, but the point of maximal tenderness was inconstant, varying slightly in position with each examination. Guarding rather than rigidity was the predominant feature on palpation of the abdomen, while noticeable distension of the lower abdomen was constantly seen. The cervical lymph nodes were not enlarged, and the white-cell count showed a polymorphonuclear leucocytosis.

The operative findings in each case except the fourth were remarkably constant: a sticky yellow peritoneal fluid lightly covering the intestine, numerous roundworms in the lower ileum, segmental spasm of the intestine, and enlargement of the mesenteric nodes. The fluid was very little in quantity, contained polymorphonuclear leucocytes, and proved to be sterile on bacteriological examination. The roundworms were always large and occupied the "dilated" portions of the bowel. The majority of the worms appeared to be alive, as movement was usually detectable on palpation through the intestinal wall; in some places, however, they were twisted together into bolus-like aggregations. The intestine showed alternate areas of spasm; these segments had the diameter of a lead pencil (about 0.5 cm.), while the dilated portions were only a little larger than normal intestine. The lymph nodes of all three groups—terminal, intermediate, and juxta-intestinal—were involved and they were fleshy, pink, and oedematous. There was never any evidence of suppuration. The parietal peritoneum appeared normal, as did the caecum, appendix, and spleen.

Operative intervention, avoiding undue handling of the intestine, was restricted to removal of the appendix and biopsy of the omentum and a single lymph node. Piperazine citrate was given three to five days after operation, and the patient felt and looked better after the evacuation of worms with the stools. No untoward reaction was observed after the administration of this anthelmintic; in fact, the body temperature reverted to normal in each case after the first post-operative bowel action.

Histological examination showed a normal appendix or lymphoid hyperplasia of the organ. The lymph nodes, on the other hand, always showed reactive hyperplasia—"sinus catarrh." The omentum was hyperaemic and congested.

The chief difficulty in the diagnosis of mesenteric adenitis lies in its resemblance to acute appendicitis. As in some of the above cases, lymphoid hyperplasia may affect both the lymph nodes and the tissue of the appendix, or appendicular colic may be caused by obstruction of the lumen of the organ by ova or worms. It is therefore often difficult to differentiate clinically between mesenteric adenitis and appendicitis. If the diagnosis of the former is suspected, however, the association with roundworms may be surmised from the following features: (1) the absence of a history of a preceding upper respiratory infection; (2) a positive history of the elimination of roundworms by vomiting or per rectum, in the recent past; (3) a history of having begun treatment for worms immediately preceding the onset of symptoms—in this connexion it would appear that piperazine is free of such "toxic" manifestations (Goodwin and Standen, 1958); and, (4) other signs of hyperinfestation, which include drowsiness, irritability, restlessness, or even convulsions (de Silva, 1957).

Operative treatment is desirable, as appendicitis can then be excluded, or it may be found to be superimposed on mesenteric adenitis in association with ascariasis, particularly as worms may initiate inflammation by ulceration of the mucosa, obstruct the lumen of the organ, or cause the appendix to be involved in the lymphoid hyperplasia (see above). Therefore, until some more specific means for detecting hyperinfestation is available the wisest course appears to be to perform laparotomy, remove the appendix, and follow this with specific anthelmintic therapy.

While it is possible that mesenteric adenitis is part of an allergic response to hyperinfestation, or is due to infection secondary to mucosal damage by the worms, there is at present insufficient evidence to substantiate these views. The clinical examples, however, show that there is a definite association between the two conditions.

Summary

The surgical complications of infestation with roundworms include intestinal obstruction, perforation, and peritonitis. The available literature makes no mention of an association between ascariasis and mesenteric adenitis. Five cases in which mesenteric adenitis was associated with hyperinfestation with roundworms are described; in only one of these was the correct diagnosis made before operation. The clinical features, the operative and histological findings, and the treatment of this clinical entity are discussed. Until a specific test is available for the detection of hyperinfestation, laparotomy and appendectomy are recommended, followed by specific anthelmintic therapy.

ADDENDUM.—Since this article was presented for publication two further cases have been encountered: it was possible to diagnose them correctly before operation, and they ran a similar clinical course.

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After the official opening of the Eleventh International Hospital Congress, the inaugural address on the main theme "Efficiency Methods in the Hospital" was given by Dr. T. E. Chester, professor of social administration at Manchester University. He considered that the present interest in efficiency methods was not merely a passing phase, but was becoming a fundamental and essential part of the new equipment of hospitals. The universal steep rise in running costs and the shortages of staff, caused by increased specialization and the change in the social climate in which the hospital has to operate, are but one reason for the need for efficiency methods. Another is the fact that capital expenditure has also risen. . . . The third trend which Dr. Chester distinguished was the increase in the demand for hospital services, coupled with a change in demand. The hospital is no longer a place for poor people in which to die; it has become one of the first essentials of a civilized community. (International Hospital Federation, *News Bulletin*, June, 1959.)

MESENTERIC CYSTS WITH MALROTATED INTESTINE

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Developmental mesenteric cysts are rare. It appears to be more than a coincidence that in four children with this anomaly malrotation of the intestines was also present. The association of these two conditions was first described by Hunter (1922). Subsequent reports have been made by Sala and Nachamie (1929), by Goldberg *et al.* (1940), by Mendillo *et al.* (1952), and by Kron and Satinsky (1954). We have been stimulated to seek for a common factor in their aetiology.

Case 1

A girl aged 6 years was admitted to hospital under the care of Mr. Charles Donald. Intermittent abdominal pain and vomiting started when she was 18 months old, and she vomited once weekly until the age of 4. For the next two years she vomited once a month and the vomitus was always green. Her appetite was poor and her stools had recently become a pale yellow colour.

On examination a smooth, round, mobile cystic swelling 7 cm. in diameter was palpable in the right lower abdomen. The cyst could be freely pushed into the right hypochondrium and into the left iliac fossa.

At laparotomy the cyst was found to be situated "in the wall" of the proximal jejunum, and the blood vessels on its surface were continuous with those encircling the gut. There was a volvulus of the cyst together with the associated jejunal loop, but in addition there was an incomplete rotation of the intestines. The duodeno-jejunal flexure was situated to the right of the midline, and from it a peritoneal band ran laterally across an abnormally high caecum. Division of this band liberated the duodeno-jejunal flexure and the caecum, permitting the display of a mesentery, universal for the small and large gut and having a 5-cm. fenestration at the ileo-caecal junction.

The cyst and the adjacent jejunum were resected, a side-to-side anastomosis restoring intestinal continuity. The mobilized caecum was placed in the left iliac fossa prior to wound closure. Recovery was uneventful and the patient was discharged on the twelfth post-operative day.

Dr. Martin Bodian reported on the excised specimen. "The specimen consists of small bowel 10 cm. in length of normal uniform calibre . . . on its mesenteric border is a spherical cyst 6 cm. in diameter containing almost clear, slightly mucoid yellowish-brown fluid. The smooth, thin fibrous wall of the cyst is covered by serosa and the lining is not loculated. Near the cyst's attachment to the bowel wall the lining is opaque and slightly thickened . . . with raised areas of yellow pigmentation. . . . Microscopy: the cyst wall is formed of collagenous tissue and the lining is a layer of flattened endothelial cells. These appearances are compatible with a diagnosis of mesenteric cyst."

Case 2

A girl aged 4 years presented as an emergency case with a severe attack of abdominal distension and vomiting and