or the finding of amoebae in the stools will suggest amoebiasis, but it should be remembered that carcinoma and amoeboma may coexist in the colon just as in the rectum.

In the early stages of the tumour formation the whole mass will melt away miraculously after emetine treatment.

A soldier had a history of dysentery 13 months ago; now pain in the anal region and retention of urine. Sigmoidoscopy showed a firm irregular tumour on the posterior rectal wall covered with mucopus. Examination of the stools and mucopus showed no amoebae or cysts. After a course of injections of emetine the tumour totally disappeared within one month.

When the amoebic lesion has been present for a long period, however, the superadded result of chronic secondary infection, fibrosis, and distortion of the colon may prevent the mass disappearing with anti-amoebic treatment. In such cases excision of the tumour may be necessary not only to treat the ill-health, recurrent diarrhoea, and obstructive symptoms, but also because it is impossible to exclude carcinoma.

Squad. Ldr. X., aged 44, had diarrhoea in Mombasa 17 months ago and recurrent attacks since. During the past 6 months he had increasing and recurrent abdominal colic with pain in the right iliac fossa, anorexia, loss of weight, and slight fever. A large tender mass was palpable in the right iliac fossa; w.b.c. 17,000; sigmoidoscopy—amoebic ulcers in rectum; active *E. histolytica* in stools. Given two courses of emetine and one of carbarsone; after each course the mass was much smaller, the patient improved in health, became apyrexial, and was allowed up and about. (Seen by Gp. Capt. C. W. Flemming.) Barium meal and enema showed a large tumour bulging into the caecum and pushing it upwards. The ileo-caecal junction could not be demonstrated with certainty, though it was thought to be above the main mass. The intra-luminal projection was quite smooth. Diagnosis: ? amoeboma—unlike a carcinoma. Two months later the mass again became larger and the patient was not so well; he was transferred to the M.E. Rectal Centre. The tumour was thought to be an amoeboma, which as a result of prolonged secondary infection did not subside completely with emetine. Pre-operative blood transfusion, sulphasuxidine, and a few grains of emetine were given.

Operation.—A huge inflamed mass was present in the caecum, attached to the anterior and posterior abdominal walls; many adherent coils of small intestine were separated; one loop formed a fistula with the mass (this was where the x rays suggested the ileo-caecal junction); mobilized with difficulty. Ileo-caecal resection—lateral ileo-colic anastomosis—sulphathiazole powder locally—drainage of retroperitoneal tissues—abdomen closed. Emetine 8 gr. was given after operation. Uneventful recovery; secondary anaemia treated with blood transfusion and iron.

Even after its removal and macroscopic examination the tumour was thought to be an amoeboma until examined microscopically.

Pathological Report (Capt. A. W. Morgan, R.A.M.C.).—"Specimen consists of 8 in. of terminal ileum, a caecal tumour, and the ascending colon. The terminal ileum disappears into the tumour and there is a fistula between the ileum and the mass. On section the tumour is pale white, mottled with areas of fat, haemorrhage, and necrosis. The last 2 in. or so of ileum winds through its substance. The tumour has pushed upwards into the lumen of the ascending colon, terminating in a valvular opening (? site of ileo-caecal valve)."

Histology.—Adenocarcinoma, Grade II, with mucoid degeneration. One gland examined was not invaded. No evidence of amoebiasis.

The marked decrease in size of this tumour following the use of emetine, the finding of amoebae in the stools, and amoebic ulceration in the rectum, make it probable that this patient originally had both a carcinoma and an amoeboma, and the latter disease had reacted to the emetine.

Amoebic Typhlitis and Appendicitis

The differential diagnosis between amoebic typhlitis, acute appendicitis, and appendix abscess often presents difficulty, since the most important diagnostic fact—the typical history of acute appendicitis—may not be forthcoming, and, further, obstruction to the lumen of the appendix may result from amoebic infection.

Operation is undesirable in the presence of uncomplicated active amoebiasis of the caecum and appendix: a high mortality rate was reported in the Chicago epidemic. Surgical treatment, however, must not be delayed when the typical history, symptoms, and signs of acute "obstructive" appendicitis are encountered within the first 24 to 36 hours, whether or not the patient has amoebic dysentery. If at operation both the caecal wall and the appendix are found to be uniformly inflamed

and the case is likely to be dysenteric, it is best not to remove the appendix unless it is obstructed and/or its blood supply is in jeopardy. Further, when there is typhlitis only, a normal appendix should be left. When appendicectomy is necessary in the presence of inflammation of the caecal wall at the appendix base, sulphathiazole or sulphanilamide powder should be sprinkled locally and adequate drainage instituted. Immediate post-operative specific treatment of amoebiasis will prevent local complications, such as skin ulceration or persistent faecal fistula.

When a mass is palpable in the right iliac fossa, though it may be impossible to distinguish between an appendix abscess and amoebiasis, its treatment, however, is the same—namely, observation of the patient and of the mass and a strict Ochsner-Sherren regimen. If indications for surgical intervention arise, treatment should be limited to simple drainage with minimal disturbance of the inflamed mass.

When amoebic infection is proved or suspected emetine should be administered. It may be assumed that a mass resolving spontaneously without emetine treatment is undoubtedly not due to amoebiasis.

Amoebic Ulceration of Anal Skin: Amoebic Fissure in Ano

Painful fissures are sometimes due to amoebiasis of the skin. They are usually multiple, but may be single. The edge of the ulcer is sharply defined and irregular, with undermining or sometimes slight heaping-up. The base has a dirty yellow and unhealthy appearance, with no surrounding induration and little inflammatory reaction, somewhat resembling synergic gangrene of the skin. Cutaneous amoebic ulceration vanishes in a dramatic way soon after the administration of emetine. One case undergoing treatment with carbarsone developed a typical amoebic anal ulcer: emetine produced an immediate improvement.

Operations on the Anal Canal and Rectum in the Presence of Amoebic and Bacillary Infection

The danger of operating upon haemorrhoids, fissure, etc., in a patient with recurrent diarrhoea soon became known. Painful, unhealthy, non-healing ulceration of the anal canal and rectum was seen in cases referred to the Centre for opinion. The cases had active bacillary or amoebic infection, or, when no specific cause could be found, sigmoidoscopy always revealed proctitis of varying degrees. One officer had been in a hospital for 2½ months with ulceration of the anus following haemorrhoidectomy performed soon after an attack of diarrhoea. The appropriate medical treatment and simple local irrigations soon produced a cure.

An instruction was circulated pointing out these dangers, and sigmoidoscopy was carried out before every rectal operation. It is unwise to do even a minor rectal operation within 6 weeks of an attack of diarrhoea, and dysenteric infection must always be excluded before operation.

The accompanying photomicrographs are reproduced by the courtesy of Dr. Habibi, pathologist, the Faculty of Medicine, Iran.

AN INVESTIGATION INTO THE USE OF SULPHASUXIDINE IN OPERATIONS ON THE RECTUM AND COLON

BY

D. H. MACKENZIE, B.A.

It has been shown by previous workers that administration of succinyl sulphathiazole (sulphasuxidine) causes profound changes in the stools of the recipient, the change most relevant to the present discussion being the decrease in the number of Gram-negative organisms. Prior to the work described here in connexion with the surgery of the rectum and colon, some investigations were carried out to study the action upon the intestinal organisms of sulphasuxidine, sulphaguanidine, and sulphathiazole. The technique used was that of Holt and Wright (*J. Path. Bact.*, 1942, **54**, 248). 0.5 g. of faeces was thoroughly mixed with 4.5 c.cm. of nutrient broth, and serial

dilutions were made up to 10^{-6} . One standard loopful of each dilution was plated on to selective media—MacConkey and desoxycholate citrate agar. Colony counts were made after 24 hours at 37°C . Films were examined wet and by Gram's stain.

The Investigation

Thirty cases were examined; eight of these received sulphasuxidine—three 20 g. per day and five 10 g. per day—and eight received 10 g. of sulphaguanidine per day. The remaining fourteen cases received sulphathiazole—six having 2.5 g. and eight having 5 g. per day. It is not intended to record the full colony counts of these earlier experiments or to include clinical details of the diseases and their courses; but an account of the results, which were remarkably consistent, is given.

Colony counts and studies of films showed, in cases receiving 20 g. per day of sulphasuxidine, a universal decrease in Gram-negative organisms. Although the results varied slightly from person to person, there were many occasions when no coliform organisms were grown from the 10^{-2} dilution, and sometimes they disappeared from the 10^{-1} dilution. In cases receiving 10 g. per day the "sterilization" was less consistent and more time was required to effect an adequate reduction in Gram-negative organisms. A dosage of 5 g. per day appears to be ineffective (see Appendix).

With the exception of the abolition of pathogenic non-lactose fermenters, the action of sulphaguanidine did not emulate that of sulphasuxidine upon the intestinal flora. Even after five or six days' treatment there was frequently a confluent growth of coliform organisms when the 10^{-1} , 10^{-2} , and, sometimes, the 10^{-3} dilutions were plated out.

The use of sulphathiazole as a pre-operative treatment has certain obvious disadvantages. It is more likely to cause toxic symptoms than either sulphasuxidine or sulphaguanidine, and is far more likely to give rise to renal complications. However, even with the small doses given in these experiments, there was a greater effect than that obtained with sulphaguanidine. There was a decline in Gram-negative organisms, and with a dose of 5 g. per day it was common for *B. coli* colonies from the 10^{-2} dilution to number less than 20.

No toxic symptoms or complications were observed in any of the cases in this series. Blood concentrations remained low, particularly with sulphasuxidine, figures about 1 mg. per 100 c.cm. being common. Figures for sulphaguanidine seldom exceeded 3 mg. per 100 c.cm., while the smallness of the doses of sulphathiazole kept the absorption low.

Estimations of sulphonamide concentrations in the faeces were carried out in many cases. This is an unsatisfactory estimation, however, because it is difficult to ensure that all the drug has been extracted from the faeces, and concentrations will vary according to the consistency of the stools and the number passed per day.

With sulphasuxidine there is an added difficulty owing to the fact that the drug is being continually broken down into free sulphathiazole. The percentage of this drug which is excreted as sulphathiazole is small, and unless stools are passed very infrequently the breakdown is unlikely to exceed 5%, and is often considerably smaller. With sulphaguanidine the concentration usually lies between 500 and 2,000 mg., while with small doses of sulphathiazole the concentration is usually below 100 mg. per 100 c.cm. These are only approximate figures, and exceptions are common.

The accompanying Appendix demonstrates the effect of various doses of sulphasuxidine. The drug appeared to exercise no effect on the growth of enterococci. Except where otherwise stated, colony counts were made from the 10^{-2} dilution only, by the technique described previously, MacConkey's medium being used in all cases.

Summary

Sulphasuxidine is capable of causing a profound decrease in the Gram-negative organisms of the intestine, as shown by colony counts and by the study of films. It will be noted that a direct swab from the carcinoma showed no Gram-negative organisms.

A dosage of 20 g. per day for four days before operation appears suitable.

The same effect cannot be produced with sulphaguanidine, but can, to some extent, be obtained with sulphathiazole.

APPENDIX

Case	Dose of Sulphasuxidine per Day	Day	Colonies of <i>B. coli</i>	Nature of Specimen
1. G.S.W. colon: Closure of colostomy	10 g.	Before treatment 1st 2nd 3rd 4th 5th	Confluent growth " Semi-confluent " " " " " "	
2. Carcinoma sigmoid colon: Resection	10 g.	Before treatment 1st 2nd 3rd 4th	Confluent growth " Semi-confluent " 3 colonies 39 " 15 "	
3. Recurrent ileitis: Ileocaecal resection	10 g.	Before treatment 1st 2nd 3rd 4th	Semi-confluent " " 77 colonies 5 "	
4. G.S.W. rectum: Closure of colostomy	10 g.	Before treatment 1st 2nd 3rd 4th	Semi-confluent 50 colonies 60 " 60 " 11 "	
5. Adenomatosis colon and carcinoma rectum: Combined excision and total colectomy; terminal ileostomy	20 g.	Before treatment 1st: 8 a.m. " 9 a.m. " 3 p.m. " 8 p.m. 2nd: 1 " 2 3rd 4th	Semi-confluent 22 colonies 10 " 3 " 7 " None " " "	Swab from growth Direct plating from ileostomy Scrape from dressing
6. Carcinoma rectum: Combined excision	20 g.	Before treatment 1st 2nd 3rd 4th	Semi-confluent 69 colonies 25 " None "	
7. Carcinoma rectum: Combined excision	20 g.	Before treatment 1st 2nd 3rd 4th: 1 " 2 " 5 " 2	Semi-confluent " " None 3 colonies None " " "	Swab from growth Swab from colostomy
8. Trial	5 g.	Before treatment 1st 2nd 3rd 4th	Confluent " " Semi-confluent Confluent	
9. Trial	5 g.	Before treatment 1st 2nd 3rd 4th	Semi-confluent " " Confluent " "	
10. Trial	5 g.	Before treatment 1st 2nd 3rd 4th	Confluent " " " " Semi-confluent Confluent	
11. Trial	5 g.	Before treatment 1st 2nd 3rd 4th	Semi-confluent Confluent " " "	

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A. O. John (*Tubercle*, 1944, 25, 69) records a case of tuberculous endometritis in a woman aged 35, in whom a symptomless pleural effusion caused a suspicion of tuberculosis. Irregular menstrual bleeding followed by curettage led to the tubercle bacillus being discovered in the endometrium. Death took place from tuberculous meningitis.