SONNE DYSENTERY—PROBLEMS IN GENERAL PRACTICE

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SONNE dysentery is now the most common endemic bacterial infection in Britain and is one of the many causes of the clinical picture of gastro-enteritis. The public health aspects of this illness have been the subject of a large number of publications but there is a marked lack of information from general practice. Advances in antibiotic treatment and changing ideas on segregation procedure add to the problems which this illness creates. The object of this paper is to report the experiences of Sonne dysentery of one general practitioner over a ten-year period.

Material and methods

Clinical. The observations are from urban partnership practice in 1957–8 and single-handed practice in a small town (population 2,300), and its surrounding rural area from October 1958 to 1966. Most of the cases of Sonne dysentery occurred in outbreaks of limited duration (table I). In the last three epidemics the length of time between diagnosis of the first and the last case is shown.

| TABLE I |
| OUTBREAKS OF SONNE DYSENTERY |
| Number of cases | 1957 | 1959 | 1962 | 1966 |
| Time between first and last case (in weeks) | 63 | 12 | 42 | 47 |
| — | 5 | 13 | 5 |

In table I the stated number of cases relates to those in which bacteriological confirmation was obtained, but in the 1966 outbreak 62 cases were notified although the diagnosis was confirmed only in 47 of these. Apart from these outbreaks four cases of Sonne dysentery were diagnosed in the first nine months of 1958 prior to the change of practice. There were four sporadic cases confirmed.

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between October 1958 and May 1963 in a series of 343 stool samples sent for culture from patients with diarrhoea. From May 1963 till the most recent outbreak in September 1966, the cases confirmed were visitors to the area—a boy who came to a scout camp (the only one at the camp to be affected), and six members of a family in transit in a caravan.

Community care. County sanitary inspectors visited each household subsequent to notification to the medical officer of health. Stool samples were obtained from every person in the household. Adults were kept off work during the acute stage of the illness when they were passing loose stools. Thereafter they were allowed to return to work but were warned of the risk of their being able to transmit infection. School children suffering from diarrhoea were excluded from school, as were all other children of school age in the household. In the last two outbreaks the general practitioners have made a practice of handing out duplicated leaflets explaining the mode of spread of Sonne dysentery and precautions which parents should take in an attempt to limit its spread through the family. The other practitioner in the town was using the same treatment routine for this illness. The need for careful hand-washing after they have been to the toilet has been impressed upon the children in the local school. They have been taught to rinse their hands in bowls of antiseptic, and the school janitor and his staff have made regular rounds of the school toilets disinfecting toilet seats and all handles during the outbreaks.

Laboratory. Initially stool samples were sent only for isolation of Shigellae and Salmonellae but from 1960 to 1963 additional studies were undertaken including microscopic examination for Giardia lamblia and other parasites, attempted isolation of enteropathic viruses and for other possible bacterial agents, i.e. enteropathic Escherichia coli, Staphylococci and Clostridium welchii. The detailed results of these studies will be published elsewhere (Wilson 1967).

Two laboratories were involved in the investigation of the last three outbreaks. Laboratory A (Lab. A) provided a local diagnostic service for initial cases in a household. This is a small laboratory and it was unable to cope with the great number of samples required for the screening of home contacts and tests of cure which were sent to Laboratory B (Lab. B), the area laboratory. Details of the laboratory methods are included here because certain anomalies were noted in the results.

Lab. A: Stool samples were plated on a MacConkey plate and on desoxycholate citrate agar and were also incubated in selenite F broth. They were incubated at 37°C and examined and subcultured after approximately 18 hours. Identification was made by biochemical and serological methods. Sensitivity tests were
carried out on Oxoid D.S.T. Agar Base using Sentest (Evans) low strength discs for streptomycin, tetracycline, sulphonamide, ampicillin, penicillin, nitrofurantoin and erythromycin, and mast sensitivity discs for neomycin.

Lab. B: Stool samples were plated on desoxycholate citrate agar and also incubated in a fluid medium containing selenite F. Incubation was for 18–24 hours at 37°C. On the next day the selenite was subcultured on to desoxycholate citrate agar. Identification was made by subculturing in sugar media and peptone water. Sensitivity testing was done on an agar plate using mast sensitivity discs for ampicillin, colistin, kanamycin and soframycin. The discs used for sulphonamide, tetracycline, chloramphenicol, streptomycin and neomycin were used wet and made in the laboratory according to the method described by Cruickshank (1965).

At the beginning of the 1966 outbreak stool samples were still being forwarded from Lab. A to Lab. B for virus culture. When it was realized that there was an outbreak of Sonne dysentery this procedure was altered and samples from Lab. A were forwarded to Lab. B only if no intestinal pathogens were isolated. Lab. B was receiving a large number of samples from dysentery contacts from this one small town and repeated, on 16 occasions, attempted isolation of dysentery organisms which had already been done in Lab. A.

Colicine typing (a method by which Shigella sonnei can be divided into 17 different epidemiological types) was performed by the method described by Gillies (1964) on strains isolated in Lab. B.

Results

Clinical. The dosage of the various antibiotics to which reference will be made was in accordance with the manufacturer’s recommendations relating to the age and weight of the patient. Changes in sensitivity of Sh. sonnei from sulphonamides to antibiotics have been an important feature of the outbreaks. In 1957 the illness responded for the most part satisfactorily to treatment with phthalylsulphathiazole, though a small number of cases needed repeated courses to procure bacteriological clearance. In 1959 this sulphonamide was used as an initial treatment with all cases and most showed an apparent satisfactory clinical improvement. When further bacteriological samples were submitted for test of cure however they were almost all reported as positive. Proprietary mixtures of streptomycin and sulphonamides or a simple mixture containing streptomycin alone were much more successful. In a few instances two courses of streptomycin were required and latterly neomycin was used for a small number of cases.

In 1962 it was noted that resistance was developing to various antibiotics, even during the course of treatment of successive members of the family. To obtain satisfactory bacteriological clearance it was not possible to use the same antibiotic for each of the family. The laboratories at this time were not providing routine sensitivity reports but the clinical observations and the failure to obtain
bacteriological clearance left little doubt that resistance was developing. It was found necessary to use a proprietary streptomycin-sulphonamide mixture, tetracycline, furantoin, chloramphenicol and for a small number of cases, paromomycin. One patient was treated unsuccessfully and successively with furantoin, chloramphenicol and tetracycline (though the course of this may have been inadequate), before a final course of paromomycin was followed by negative bacteriological culture from stool samples. Chloramphenicol was used for a limited number of cases and is certainly no longer considered a suitable treatment for such a mild disease.

In the 1966 outbreak treatment was started with tetracycline for children and oxytetracycline for adults. From previous experience it was expected that it would soon be necessary to change this treatment when resistance was encountered. Early in the outbreak families who had experienced this infection in previous years asked if they could all be treated at once to try to limit the spread of the disease. The treatment of whole families with these broad spectrum antibiotics was undertaken with considerable apprehension, but trouble was encountered only in two instances out of 239 individuals so treated. One of these, after Sh. sonnei had been eliminated from the stool, had a recurrence of diarrhoea with an extremely heavy growth of proteus species. The other, a food-handler contact of a child who was ultimately found to be bacteriologically negative for Sh. sonnei, developed a marked diarrhoea and a profuse growth of Candida albicans was obtained from stool culture.

The treatment of each member of the family with oxytetracycline was begun whenever stool samples had been obtained. An exception was made of pregnant women. In children under one year neomycin was substituted to avoid effects on the teeth. Most families seemed enthusiastic about this form of treatment but in one instance at least, a number of members of one family were known to discontinue treatment after one or two days because of nausea and vomiting which they claimed had been produced by the oxytetracycline.

There was a very low incidence of multiple cases of Sonne dysentery in the families, the average case incidence per family being 1.6 in 1966 compared with 2.7 in the 1962 outbreak. The many variable factors influencing the outbreaks, such as sizes of families, ages of children, and amount of exposure to infection, make it impossible to relate this incidence to the treatment of the whole family. A small number of patients were latterly treated with neomycin before laboratory sensitivity results were received, because of the suspicion that the effectiveness of tetracycline was the cause of the failure. In fact very few patients continued to excrete Sh. sonnei in the stool after treatment. This was unexpected. There were only three clear failures of antibiotic treatment in the 1966 outbreak. Two of these were to
treatment with neomycin and one after treatment with tetracycline. Two diarrhoea cases in another family were given treatment with tetracycline but the stool samples taken before the treatment started were reported as negative for *Sh. sonnei*. They were, however, given their full course of treatment and stool samples were sent for test of cure. In one case both samples for test of cure were positive for *Sh. sonnei* and in the other both were negative but a subsequent sample five days later was positive. It is difficult to know whether to class these as treatment failures with failure to grow the organism from the initial samples or as secondary infections occurring after they had completed their course of treatment.

*Community care.* In 1966, the programme of excluding both cases and symptom-free contacts caused a great deal of absence from school. There are 320 children attending the local school. The children with dysentery lost altogether 1,030 half-days of school attendance, and their home contacts were off school for an additional 1,466 half-days.

*Laboratory.* The investigation of the cases and contacts in these outbreaks has caused a great deal of work for the laboratories and also for the general practitioner and sanitary inspectors (table II).

**TABLE II**

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
<th>Positive cultures</th>
<th>Negative cultures</th>
<th>Total cultures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1957</td>
<td>63</td>
<td>132</td>
<td>156</td>
<td>288</td>
</tr>
<tr>
<td>1959</td>
<td>12</td>
<td>29</td>
<td>75</td>
<td>104</td>
</tr>
<tr>
<td>1962</td>
<td>42</td>
<td>67</td>
<td>168</td>
<td>235</td>
</tr>
<tr>
<td>1966</td>
<td>47</td>
<td>51</td>
<td>342</td>
<td>392</td>
</tr>
<tr>
<td>Total</td>
<td>164</td>
<td>279</td>
<td>741</td>
<td>1,020</td>
</tr>
</tbody>
</table>

The total experience of Sonne dysentery for one practitioner in a ten-year period has been of 179 cases for which there has been bacteriological confirmation. The investigation and supervision of the 164 cases which occurred in four outbreaks have required over 1,000 stool samples.

From the 16 samples in the 1966 outbreak which were cultured for dysentery in both laboratories one reported positive in Lab. A was subsequently reported negative by Lab. B and two reported positive by Lab. B had already been reported negative by Lab. A.

*Laboratory antibiotic sensitivity reports.* At the beginning of the most recent outbreak the two laboratories were consistently giving reports which were conflicting about two antibiotics (table III).

In addition Lab. A reported the *Sh. sonnei* as sensitive to nitro-
TABLE III
INITIAL ANTIBIOTIC SENSITIVITY REPORTS—1966
(+ = sensitive, — = resistant)

<table>
<thead>
<tr>
<th>Tetracycline</th>
<th>Ampicillin</th>
<th>Streptomycin</th>
<th>Sulphonamide</th>
<th>Neomycin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab. A</td>
<td>+</td>
<td>—</td>
<td>+</td>
<td>—</td>
</tr>
<tr>
<td>Lab. B</td>
<td>—</td>
<td>+</td>
<td>+</td>
<td>—</td>
</tr>
</tbody>
</table>

furantoin and resistant to penicillin and erythromycin. Lab. B reported it sensitive to chloramphenicol, colomycin, soframycin and kanamycin.

On one occasion two such reports which contradicted each other concerning ampicillin and tetracycline were given for the organisms isolated by the two different laboratories from a single stool specimen container. Since Lab. A was concerned with much of the initial diagnosis, most patients were treated with tetracycline or oxytetracycline before this difference of opinions was noted. Clinically and on bacteriological test of cure tetracycline appeared to be producing very satisfactory results. Both laboratories were told of the discrepancy and undertook further studies and latterly Lab. B also reported the organism as sensitive to tetracycline.

Colicine types. In 1959 the Sh. sonnei isolated was type 14. In 1962 type 11 predominated but an untypeable strain was also noted. In 1966 the isolations were type 7 except that the culture which showed persistence of Sh. sonnei after unsuccessful treatment with tetracycline was untypeable, whereas the initial culture had been type 7.

Discussion

During an outbreak of dysentery there will be patients suffering from diarrhoea from whose stool samples Sh. sonnei will be isolated. This is usually accepted as confirming an active infection but is not necessarily so since a patient may be a carrier from an earlier episode.

In other diarrhoea cases successful bacteriological isolation will not be obtained. A negative result from a single sample is not a complete guarantee that the patient has not suffered from Sonne dysentery. In practice this point is liable to be overlooked. Where there are several cases of diarrhoea in a household and one or more has a positive stool culture for Sh. sonnei then it is highly probable that the others are also suffering from this infection whether or not a positive bacteriological culture can be obtained. Ross (1955) found that only 27 out of 199 clinical cases which were bacteriologically negative had had samples taken before treatment was begun. To have the best possibility of success stool samples should be taken before treatment is commenced. This has been our routine practice
but even then successful culture is not inevitable.

During an outbreak there will be patients with diarrhoea who have never had any bacteriological examination and this group will include those of unknown number who have never sought medical advice. The clinical illness is usually so mild that cases will be missed unless the community is aware that the infection is becoming prevalent. The appearance of the stool is by no means characteristic. The presence of blood and mucus is the exception rather than the rule. In the investigation of the home contacts of known cases a certain number of patients will be found to give positive bacteriological isolations though they have no present symptoms.

The true incidence of infection with *Sh. sonnei* is unknown because the patient must first consult the doctor and the doctor must then arrive at a diagnosis and notify the public health authority. Since notification involves visits from sanitary inspectors, contact investigation, and school exclusion, widespread notification of bacteriologically negative cases is unlikely. On the other hand, bacteriologically positive cases will only be notified by the minority of doctors who undertake laboratory investigation of diarrhoea. General practitioners are discouraged from this by the large number of negative results they will obtain. Gillies (1965) found 80 per cent of 1,354 cases of diarrhoea to be non-bacterial. There was an 80 per cent negative culture rate also in this practice between 1958 and 1963 but from the 343 stool samples taken in the absence of outbreaks of dysentery the negative culture rate was as high as 93 per cent.

Some doctors may be deterred by the disturbance to the family caused by formal notification and prefer to treat the patient or patients with antibiotics or sulphonamides and remain in ignorance of the exact pathogen. This policy does not allow for the development of antibiotic resistance.

It is accepted that this infection is one of the most prevalent in the country (*Brit. med. J.* 1965) and that official notifications represent only a fraction of the total number. There are some who believe that the disease is so trifling and control so difficult that to remain inactive while it runs its course is the only sensible attitude. On the other hand an epidemic has been recorded (Murchison 1966) in an Inverness-shire village served by two doctors (population 2,300) where the medical officer of health estimated that there had been some 500 to 600 cases of Sonne dysentery. He included in this count 27 food handlers, and ultimately the local water supply was also affected. This shows what can happen with a community similar in size to the one here.

Ludkin (1955) and Beer *et al.* (1966) have described the control of
outbreaks of Sonne dysentery by 'hygienic measures only', i.e. by hand washing and the use of antiseptics, but scepticism as to the value of such measures has been expressed (Lancet 1966). It seems probable that the segregation procedure is now outdated. If children were only segregated when they had diarrhoea, which would be in accordance with the work of Hutchison (1956), then management would be made much easier. "The isolation of the symptomless convalescent is a waste of time"—(Lancet 1959). This does not seem an appropriate routine for symptom-free contacts who are being subjected to courses of prophylactic treatment. If segregation is really necessary then surely there is a need to investigate the classmates as well as the home contacts, if there are several cases in a class. This was not done in these outbreaks even for the children of food handlers, though considerable numbers of their classmates were off school with Sonne dysentery.

When various specific agents are available for such an infection, general practitioners do not usually consider leaving it untreated. There is a tendency to treat without having a clear diagnosis 'just in case' the condition is a bacterial infection. This tendency is encouraged by extensive advertising of sulphonamides and antibiotics and by failure to appreciate how few cases of diarrhoea can be proved to be due to bacterial infection. The development of resistance to an antibiotic when it was used for successive members of the same family occurred with both streptomycin and tetracycline, and parallels in vitro findings. There is one strain of Sh. sonnei well recognized in this country, which is now resistant to no less than eight different antibiotics. The occasional conflict in reports on one specimen examined by two laboratories probably underlines the fact that there is no such thing as an infallible laboratory test, but may also reflect problems of transporting specimens.

Trials of sulphonamides in the past have failed to show any clear benefit in preventing the spread of Sh. sonnei (Brit. med. J. 1955). There have been two recent reports of the successful use of nalidixic acid in the control of institutional outbreaks (Ward 1966, Constan 1966). The experiences described here show that tetracycline has also been successful and in an open community. Anderson (1964) states that tetracyclines are effective in obtaining bacterial clearance but they must be used with caution in hospital because of the risk of development of antibiotic resistant strains of staphylococci. He doubts if this complication will be encountered in general practice. Apart from the risks of antibiotic resistant staphylococci, proteus species and Candida-albicans, there seems to be a distinct likelihood of circulating tetracycline resistant strains of Sh. sonnei. Since the last outbreak here, an opinion has been published that tetracyclines should not be given to children if there is an alternative antibiotic
available, and that they should not be used for prophylaxis for children up to the age of seven years (Elmes 1966). Limitation of the use of these to children over the age of one year and exclusion of pregnant women therefore appears to have been inadequate. It was not at first expected that this drug would be used for more than a few families before resistance developed. There is no satisfactory explanation of why the 1966 outbreak differed from the previous one in this respect. It must be noted that there is a very considerable difference in cost between tetracycline and nalidixic acid.

A number of problems affecting the general practitioner can be noted from these experiences.

(1) A chaotic situation can exist if a few doctors inflict on their patients the full rigours of public health family supervision and school exclusion while their colleagues render symptom-free only such cases as complain.

(2) It is inconsistent to make a negative bacteriological diagnosis from the result of a single culture taken during a diarrhoeal illness, but two negative stool cultures from a symptom-free convalescent are required to ensure that *Sh. sonnei* is no longer being excreted.

(3) The Leader writers and public health services must result their doubts on whether segregation and treatment make any difference in the management of this disease.

(4) General practitioners must appreciate that this illness occurs frequently and that differentiation from other forms of gastro-enteritis is impossible on clinical grounds.

(5) There is a need for greater awareness of the wastefulness of routine administration of antibiotics in diarrhoeal cases if over 80 per cent of diarrhoeas are non-bacterial. The changing pattern of antibiotic resistance in *Sh. sonnei* must also be noted.

If effective investigation and treatment are to be provided for patients suffering from diarrhoea then this will give the general practitioner and the laboratory a great deal of work. Before antibiotics are given, stool cultures should be undertaken where there are multiple cases of diarrhoea in a family, if diarrhoea is associated with pyrexia or lasts over 48 hours, or where a food handler is involved. This will not only help to detect outbreaks of Sonne dysentery but will also identify occasional infections with *Salmonella typhimurium* which is a much more dangerous and potentially lethal organism.

**Summary**

(1) The investigation and supervision associated with 164 cases of Sonne dysentery which occurred in four widely spaced outbreaks required laboratory examination of over 1,000 stool samples.

(2) Two laboratories were involved and in the most recent outbreak both investigated the same stool samples on 16 occasions. From three of these one laboratory isolated *Sh. sonnei* while the other failed to do so and there was a difference between laboratory reports on the sensitivity of the organism to tetracycline and ampicillin.

(3) Despite previous experience of resistance of *Sh. sonnei* to sulphonamides
and antibiotics, and also of resistance developing in the course of treating different members of a family, the most recent outbreak responded very satisfactorily to treatment of cases and contacts with tetracycline.

(4) Among the problems listed are the wastefulness of routine administration of antibiotics in diarrhoeal cases if over 80 per cent of diarrhoeas are non-bacterial, the possibility that segregation is now out-dated, and the inconsistency of requiring two negative stool cultures from a patient who has recovered from dysentery but making a negative bacteriological diagnosis from the result of only a single culture taken during a diarrhoeal illness.

Acknowledgements

I wish to acknowledge the assistance in the management of this illness given by the Peeblesshire county sanitary inspectors and Dr I. R. Henderson, Innerleithen, the invaluable work done by the two laboratories, and the help of Dr R. R. Gillies in the preparation of this paper.

REFERENCES


The art of Phisick ... by the judgement of the learned, hath two principall partes: the one declaring the order how health may be preserved: the other setting forth the means how sickness may be remedied. Of these two partes (in mine opinion) that is more excellent, which preserveth health and preventeth sickness.

Thomas Cogan in The Haven of Health. 1597.