administered per rectum every four hours. This treatment seemed to act extremely well in the five cases in which it was tried by the writer. In the *Mayo Clinics, 1929*, Alvarez suggests the use of choline, which is said to be a normal constituent of intestinal muscle and concerned with maintaining peristalsis.

TABLE VII.—Use of Bile Enemata

No. of Case	Age in Years	No. of Hours Ill	Operative Findings and Treatment	Post-operative Treatment	Result
1	11	72	General peritonitis from ruptured appendix; ileus—enterostomy; <i>B. welchii</i> antitoxin	Distension persisted; 1 oz. bile run into bowel through enterostomy tube	Cured
2	14	38	Localized pelvic peritonitis from ruptured appendix—local drainage	Marked post-operative distension and vomiting dark brown fluid; 1 oz. bile in four-hourly enemata	Cured
3	48	48	Ruptured appendix; general peritonitis; 2 free concretions	Post-operative distension; vomiting; 2 oz. bile in saline, four-hourly enemata	Cured
4	14	78	General peritonitis; ruptured appendix—enterostomy	Post-operative distension; vomiting; <i>B. welchii</i> ; 2 oz. bile in four-hourly enemata	Cured
5	15	72	Ruptured appendix; general peritonitis—enterostomy	Post-operative vomiting and marked distension; 2 oz. bile in four-hourly enemata	Cured

SUMMARY

In the treatment of general peritonitis discussed above, successes have been obtained from the use of: (1) operative measures—namely, enterostomy; (2) *B. welchii* antitoxin injections; and (3) bile enemata.

RECTAL PARALDEHYDE BEFORE OPERATION

BY

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The anaesthetic is frequently a cause of much distress to the patient, both in anticipation and during its actual induction. The anaesthetist is not infrequently informed that the thought of the anaesthetic is more distasteful than is the thought of the operation itself. It is not without cause, therefore, that anaesthetists are much concerned with the problem of improving conditions for the patient, in what is almost invariably an ordeal. One obvious method of achieving this consists in appropriate premedication with a view to inducing in the patient before the operation a state of oblivion, or at least of indifference. This can be accomplished, with varying degrees of success, safety, and consistency, by the use of such drugs as hyoscine, nembutal, sodium amytal, luminal, avertin, and paraldehyde. Since the last-mentioned drug has probably been less used for the purpose than have the others, I should like to report my experiences based on a series of some 500 cases in which the paraldehyde has been administered rectally before operation.

The paraldehyde is given in a solution with saline, well shaken together, in the relative proportions of one and a half ounces of saline to each drachm of paraldehyde. The adult dose is 8 drachms of paraldehyde—that is, 12 ounces of solution—except where the patient's weight is less than 8 stone, when the amount is calculated on a basis of one drachm of paraldehyde for each stone of body weight. The average dose of 8 drachms need rarely be exceeded for any patient,

and may often be somewhat reduced without any sacrifice of results. Experience has shown that these relative proportions of paraldehyde and saline must be adhered to; a reduction in the saline content is likely to mean that some of the solution will be returned from the rectum. The properly proportioned solution is nearly always retained without difficulty if its introduction is effected slowly. The paraldehyde used must be fresh. It undergoes chemical change if kept too long, and the use of such paraldehyde may lead to transient diarrhoea after operation; no irritation occurs if the fresh drug is used.

ADMINISTRATION

The procedure is as follows. The evening before operation the patient is given an enema, and a sedative such as veronal, dial, or phanodorm. The following morning, one and a half hours before operation, 1/100 grain of atropine is administered hypodermically (no morphine is given), and immediately afterwards the paraldehyde solution, freshly mixed and thoroughly shaken, is slowly introduced into the rectum by means of a catheter. Retention is rarely difficult; sleep usually intervenes within a few minutes, and this is not disturbed when the time comes for removal of the patient to the operating theatre. The patient remains oblivious to the administration of the anaesthetic, and induction, by any of the usual methods, is singularly easy and rapid, owing to the complete absence of resistance or excitement. The maintenance of anaesthesia is a simple matter and a surprisingly small quantity of anaesthetic agent is required, even where muscular relaxation is called for. After the operation the patient sleeps quietly for a variable number of hours. He can be awakened during this period, but quickly goes off to sleep again. Spontaneous awakening usually occurs from five to eight hours after the operation, the patient remaining drowsy and comfortable for a considerably longer period, and securing, in most cases, a restful first night, often without the aid of morphine.

ADVANTAGES OF PARALDEHYDE PREMEDICATION

The method, observed in a large number of cases, appears to offer certain definite advantages, the chief of which, from the patient's point of view, is the total elimination of the unpleasantness associated with his introduction to the operating theatre, and of the still greater unpleasantness of the anaesthetic. The drug is so consistent in its action that the nervous patient can, if desired, be confidently promised that he will go to sleep quietly in his own room and that he will know nothing of operating theatre or anaesthetic. Post-operative vomiting appears definitely to be reduced, thanks no doubt to the relatively small quantity of anaesthetic required. One-half or one-third of the usual quantity of anaesthetic will, as a rule, suffice to produce the desired anaesthesia—an important advantage in long operations, where the large quantity of a toxic anaesthetic agent normally required is a matter of serious consequence to the patient.

From the anaesthetist's point of view, no greater advantage can be mentioned than the facility with which gas and oxygen can be administered after paraldehyde premedication. Upper abdominal operations are possible without the use of additional ether and with completely adequate muscular relaxation. I believe that, for gas and oxygen, it is the premedication method of choice, and will often serve to afford the patient the advantage of a pure gas and oxygen anaesthesia where this would otherwise be difficult or impossible.

The remarkable degree of post-operative comfort enables the surgeon to limit the morphine administered

—an undoubted advantage from the point of view of those who, while admitting the necessity of morphine, are disposed to associate it with the intestinal atony and consequent flatulent distension which lead to much discomfort, and with the post-operative circulatory depression which may be the initial factor in the causation of a subsequent pulmonary embolism. In respect of safety and certainty of action, paraldehyde premedication appears to compare favourably with that effected by such drugs as hyoscine, nembutal, luminal, and avertin. Comparison with avertin is particularly interesting. This would appear to favour paraldehyde by reason of its intrinsic safety as a drug, the absence of any blood pressure fall after its use, and the simplicity of the technique involved, while results are at least as certain and as consistent as those obtained with avertin.

Disadvantages are few. The unpleasant odour of paraldehyde appears in the breath shortly after the rectal administration; this, however, is a disadvantage of which the patient remains unaware, and of which only the nursing staff are conscious. The quiet respiration characteristic of the somnolent period following operation does not appear to increase the risk of respiratory complications. In some 500 cases no trouble of this kind has been experienced, nor has the carbon dioxide cylinder been more than ordinarily employed. Transient excitement occurs in a small number of cases, either immediately after the drug has been administered or on awakening. The occasional occurrence of this phenomenon, which is always of short duration and is of little significance, is characteristic of any drug given for purposes of premedication.

SUMMARY

Rectal paraldehyde provides a safe and certain method of eliminating for the patient the more unpleasant accompaniments of operation. He simply sleeps, and when he awakes finds that the ordeal is over—a state of affairs regarding the advantage of which the patient with previous experience of anaesthesia and operation is usually most emphatic. He remains relatively comfortable during the trying twenty-four hours following operation, and subsequent distressing recollections are absent. Preliminary rectal paraldehyde, while facilitating the anaesthetist's task, adds nothing to his anxieties concerning the patient either during or after the operation. His patient's gratitude provides a somewhat novel and not unpleasing experience.

TROPICAL TYPHUS*

BY

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The great epidemics of the war, the discovery of the Weil-Felix reaction, and the study of *Rickettsia* stimulated the investigation of typhus all over the world. The results have shown that it is but one of a group of *Rickettsial* diseases carried by arthropods, and that in this group rodents play an important part as reservoirs of infection. It is possible that *Rickettsiae* were originally parasites of the plants which form the food of adult mites, and that the earliest typhus-like diseases were those carried by mites or ticks. Typhus exanthematicus probably appeared when men took to wearing clothes, and the virus became adapted to the body-louse. There is no evidence that an infection with mite- or tick-borne virus can at any moment give rise to an epidemic of typhus in the presence of human lice, but Anigstein¹

states that he has succeeded in infecting the latter with the virus of the non-louse-borne tropical typhus, both by feeding and by injection.

FEATURES OF THE DISEASE

The symptoms of tropical typhus are those of typhus exanthematicus, but as a rule the fever is less severe and more remittent, the rash is often inconspicuous or absent, and the nervous symptoms are less prominent; occasionally, however, a severe case occurs, with petechial rash, coma, and other symptoms indistinguishable from those of typhus. The morbid anatomy and serology of the disease, together with the results of animal inoculations, show conclusively that it is a member of the typhus group. Lewthwaite² has found, both in the brains of fatal human cases and in those of guinea-pigs and rats inoculated with infective material, vascular lesions similar to those occurring in typhus fever, and he has also demonstrated *Rickettsiae* within the swollen endothelial cells of the affected vessels. Guinea-pigs react less readily than is the case in typhus exanthematicus. Only 5 to 10 per cent. give a febrile reaction after inoculation with human blood, but, according to Lewthwaite,² there is a pronounced loss of weight in about 25 per cent. Rats are more susceptible, and a febrile reaction occurs in 27 per cent. Anigstein¹ has reported the occurrence of the Pinkerton-Mooser reaction in about 6 per cent. of inoculated guinea-pigs. This reaction, which occurs regularly in Mexican typhus, consists of swelling of the scrotum and injection of the tunica vaginalis, in the exudate of which *Rickettsiae* are found in great numbers. A positive Weil-Felix reaction is obtained in many of the rabbits and rats inoculated with patients' blood (Anigstein¹). Lewthwaite is now employing with success the intraocular method of inoculating rabbits, which Nagayo has used both in the tsutsugamushi disease and in typhus.

In spite of these numerous points of close resemblance, tropical typhus differs utterly from typhus exanthematicus in its epidemiology; it neither spreads from man to man nor occurs in epidemics. We⁴ had not been working at it for long before we found that it was not a single disease, but two, there being an urban and a rural (or scrub) form. The two are clinically indistinguishable, but in their aetiology and epidemiology they are as different from each other as Rocky Mountain fever is from typhus exanthematicus.

Urban Form

The urban form attacks more especially those who work in stores—particularly food stores—and in Kuala Lumpur many of the cases come from streets where sporadic plague sometimes occurs. As in Brill's disease, the reservoir of infection is probably the rat, and the vector *Xenopsylla cheopis*. The disease is never epidemic because it does not kill the rats, and therefore the rat-fleas are not constrained to seek strange and unpalatable hosts. The Weil-Felix reaction is positive with X 19, and this urban form is evidently very closely related to Brill's disease, in which the virus is almost identical with that of typhus exanthematicus. The mortality is negligible. The rural form is also very mild as a rule, but occasionally it is severe, and in 1929 there were eleven deaths among 154 cases.

Scrub Typhus

The rural form, or scrub typhus, occurs in all parts of the Malay States and in the Dutch Indies, but though its distribution is wide it is patchy, and the infected places are circumscribed areas of untilled open country, especially land which, after being cleared of jungle, has been allowed to grow up in weeds and scrub. The lack

* Read in the Section of Tropical Medicine at the Centenary Meeting of the British Medical Association, London, 1932.