to me that the poison has only acted as a mild stimulant to the liver tissue and has had no toxic effect.

Although many cases of poisoning have occurred from the use of mercury perchloride as a vaginal douche, I am not aware of an instance in which the circumstances were similar to the present case. It is interesting also to note the typical nature of the symptoms produced and the manner in which mercury picks out the lower end of the small intestine, the caecum, and the ascending colon as its selective site. The suppression of urine and the evident changes found in the kidney tissue show the marked action of mercury on this organ. The medico-legal aspect of the case is also of importance.

I am greatly indebted to Professor Harvey Littlejohn for his assistance in compiling the notes of the case.

CASE OF PUERPERAL SEPTICAEMIA TREATED BY AUTOGENOUS VACCINE, WITH RECOVERY.

By WILLIAM GRIER, M.B., Ch.B., D.P.H.,
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THE following case presents features of both clinical and bacteriological interest:

Mrs. M., aged 28, was delivered of twins on February 3rd, 1916. Two years ago I had delivered her with forceps of her first child, and fully a year ago I curetted her for an incomplete abortion.

There was nothing very unusual about the labour, the first presentation being a footling ending in a breach, and the second a vertex. The children weighed 5½ lb. and 5 lb. respectively. There was a slight tear of the perineum. The patient continued well until the afternoon of the eighth day, when she felt hot and flushed. On the following morning she complained of rheumatic pains behind the left shoulder. She felt sick, and vomited freely. The temperature was 101° F., and the pulse 100. The lochia was not fetid. The uterus was firm and well involuted. There was no abdominal tenderness. The milk secretion was free. She had a superficial inflammation of the gums associated with a few carious teeth. Quinine salicylate, combined with Dover's powder, was prescribed. In the evening the temperature was 102° F., and during the following two days it ranged between 101.5° F. and 103° F. Rheumatic pains in the left shoulder and in the bursa over the left elbow were prominent symptoms. On the fourth morning of her illness she was given a vaginal douche. In the evening her temperature had fallen to 100° F., and she felt decidedly better. For two days thereafter there was no pyrexia. On the morning of the seventh day of her illness, however, the temperature had risen to 104° F., and the pulse-rate 120 to 130. There was now severe pain and tenderness associated with some swelling over the left suprapatellar synovial pouch. The milk secretion had practically ceased. Quinine sulphate was prescribed freely. During the next six days the temperature ranged between 103.5° F. and 105° F., and the pulse-rate from 120 to 140. She had five severe rigors, occurring chiefly at night. There was also pain in the right groin. The inguinal glands were slightly enlarged and were associated with a pustular eruption on the pubis. Quinism developing, the administration of the drug was stopped. On the ninth and eleventh days of her illness 20 c.cm. and 25 c.cm. of antistreptococcal serum were given and on the thirteenth day 25 million of streptococcal vaccine (from a fatal case of puerperal septicaemia) were injected.

Meanwhile, an autogenous vaccine was prepared from her own blood, the culture being a pure growth of a short chained diplo-streptococcus. Of this 25 million organisms were injected on the sixteenth day of her illness, and on the eighteenth day 50 million. Every third day thereafter she was given 50 million until near the end of her illness, when she had 75 million. The course of the temperature during the remainder of her illness is indicated in the chart. A curious feature in the case is the rise of temperature (marked X) on the morning of the

twenty-fourth day of her illness to 102.8° F. This was associated with a well-marked, fine, but discrete papular rash of scarlatiniform type, appearing first on the face, chest, and upper extremities, and on the following day, but less pronounced, on the lower part of the body and lower extremities. There was no erythema, urticaria, or itching, as frequently found in serum rashes. Desquamation occurred after the rash had gone. Shortly afterwards there was a fall in temperature, with a subsequent rise associated with abscess formation in the bursa over the right shoulder. After this was opened the temperature gradually fell to normal. She also had a dry, angry-looking herpetic eruption at the left angle of the mouth, which was not of the vesicular type as met with in most febrile diseases. She made an excellent convalescence, and is now in good health.

The source of infection is somewhat obscure, but clinically I am inclined to regard the case as one of scarlet fever which had developed during the puerperium. The organism has microscopic and cultural characteristics more in common with the organism described by W. Mair in the *Journal of Pathology and Bacteriology* (vol. xix, No. 3), in his article on "Experimental scarlet fever in the monkey," than with the ordinary *Streptococcus brevis* of the mouth. A similar organism I have since isolated from cervical and axillary glandular abscesses occurring in scarlet fever patients treated by the Milne method in their own homes.

The patient was treated in a house of one apartment, in which there also lived and slept her husband, mother, the twins, and for a time, her first child. There was no previous history of the patient having suffered from scarlet fever.

I am much indebted to Nurse Allan (the maternity nurse of the burgh), who attended the patient from the second day of the puerperium and throughout the illness, and also to Dr. John Anderson (bacteriologist to the Victoria Infirmary) for his services as clinical bacteriologist in the case.

A NEW SOLID MEDIUM FOR THE ISOLATION OF THE CHOLERA VIBRIO.

By CAPTAIN H. GREME GIBSON, R.A.M.C.

BASED on the fact that the cholera vibrio alone of all the intestinal organisms acidifies starch, the following alkaline medium has been devised for its rapid isolation.

Owing to the medium possessing differentiating properties it should be especially useful in the detection of "cholera carriers," as the faeces emulsified in broth can be plated directly on to it. In the case of water examination, after enrichment in peptone water for a few hours, if a drop or two of the peptone water is plated a tentative diagnosis can be arrived at in eighteen hours owing to the allied vibrios taking a longer time than the true cholera vibrio to bring about acid production.

Preparation of Medium.

The formula is: Agar 30 grams, peptone 10 grams, starch 10 grams, sodium bicarbonate 1.5 grams, litmus (sufficient to colour medium), and water 1,000 c.cm.

Weigh out 30 grams of powdered agar and emulsify with 250 c.cm. of cold water. Then weigh out 10 grams of peptone (Chapoteaut) and 1.5 grams of sodium bicarbonate. Mix together and emulsify in another 250 c.cm. of cold water. The two emulsions are then mixed in a two-litre flask and another 500 c.cm. of water added. The solution is complete in the steamer. When dissolved the medium is clarified with white of egg and filtered in the steamer.

Weigh out 10 grams of potato starch, emulsify it with some of the filtered agar, and add the emulsion to the remainder of the medium.

The whole is sterilized by the fractional method, after which enough sterile watery solution of litmus is added to bring about a blue colour of the medium.

The final reaction of the medium will be found to be -2 to phenolphthalein. I tried several degrees of alkalinity and found that 0.15 per cent. sodium bicarbonate gave quite the best results.

If the plates are examined eighteen hours after inoculation, by looking obliquely through them with a dark background behind, the plate being held parallel to the window, the cholera colonies will be seen to have acquired a faint pink colour, while the colonies of the other intestinal organisms are blue or of a whitish colour. The examination is facilitated by the use of a hand lens. At this time the allied vibrios also produce blue colonies, but at the end of about thirty-six hours they also acidify the medium, though to a less extent than cholera.

At the end of twenty-four to twenty-six hours the cholera colonies have attained a delicate pink colour with a faint pink halo round them, while the other colonies still remain blue; also the colonies are of a good workable size to pick off and proceed with the serological tests.

After forty-eight hours, if the cholera colonies are in excess and the plate spread somewhat thickly, the medium itself becomes distinctly acid, and colonies other than those of cholera take on the pink tinge. However, the cholera colony even at this time can still be distinguished by the deeper red centre which the other colonies lack.

The only other organisms which are known to acidify starch are some of the diphtheroid group and some of the non-pathogenic water vibrios. These should not present any great difficulty, as Gram's stain on the one hand, and the serological test on the other, dispose of these organisms.

The following experiments have been carried out:

Experiment 1.—Ten cubic centimetres of broth were inoculated by emulsifying some faeces in it. To this was added a very small quantity of a culture of *V. cholerae*. The tube was well shaken, and 0.25 c.cm. of the broth transferred to a second tube of broth. Two drops of this broth were immediately plated on to the medium, the same rod being successively used for three plates. The first plate was too crowded to be of any use, but the second and third plates gave good discrete colonies, and on these plates the cholera colonies could be recognized in eighteen hours. Every colony on these plates was picked off, and all the pink colonies were proved to be cholera, whilst the blue colonies in every case proved otherwise.

Experiment 2.—The first broth tube from the previous experiment was kept at room temperature for two days. At the end of that time 0.25 c.cm. of this broth was added to 10 c.cm. of fresh broth, and a drop of this was immediately plated out as in the first experiment. The plates were rather too thickly spread to give good discrete colonies, but the cholera colonies could be easily detected. These colonies were again tested with cholera immune serum, and the differentiation proved correct.

Experiment 3.—This experiment was undertaken to see whether any of the normal water vibrios were capable of acidifying starch. The water was taken from a pond after heavy rain, and was taken straight to the laboratory. Some of the water was first enriched by incubating in peptone water for a few hours. One drop of this peptone water was then plated, and at the end of eighteen hours a few pinkish colonies were present. Some more of the water was plated direct, and in this case it took twenty-four hours before any pinkish colonies appeared. In both cases the pink colonies that were present were of a lighter shade than that which is produced by the cholera vibrio, and I do not think that they are very likely to be confounded with it. In addition, the red centre to the colony that is produced by the cholera vibrio in forty-eight hours was not present in these cases. This organism proved to be a normal vibrio of water.

Other Experiments.—The following organisms were also plated out: *B. typhosus*, *B. paratyphosus* A, *B. paratyphosus* B, coliform organisms, *B. dysenteriae* (Shiga and Flexner), *B. enteritidis* (Gaertner), streptococci, *V. Finkler Prior*, *V. metchnikovi*.

In no case did the above organisms acidify the medium, except in the case of the two vibrios, which produce a slight pink halo, but the colonies themselves, when viewed obliquely, do not become pink until a very much longer time has elapsed than that required to recognize the vibrio of cholera.

REFERENCE.

¹ Gordon, M. H.: Note on the ability of *V. cholerae asiaticae* to decompose starch, *Centralt. f. Bakt.*, 1 Abt., orig., Bd. 42, 1906.

NOTE ON THE VALUE OF HEXAMINE IN AURAL SUPPURATION AND IN MENINGITIS.

BY

DOUGLAS GUTHRIE, M.D., F.R.C.S.E.,

LIEUTENANT R.A.M.C.

HEXAMINE (urotropin) has come to be recognized as the most efficient of urinary antiseptics. Its action depends on the fact that it is for the most part excreted by the kidneys, and, in an acid urine, undergoes decomposition, liberating free formaldehyde.

Various experimenters have stated that after administration the drug may be recovered not only from the urine, but from the bile, pancreatic juice, saliva, milk, etc., from the synovial and cerebro-spinal fluids, and from nasal and aural discharges.

Crowe demonstrated that hexamine given by the mouth could be detected in the cerebro-spinal fluid withdrawn by lumbar puncture one hour later. He also asserted that

after the subdural inoculation of dogs and rabbits with streptococci the administration of hexamine appeared in many cases to avert the onset of meningitis, and, consequently, he advocated its routine use prior to operations on the brain or spinal cord. Barton followed up these observations by suggesting that the drug might prove useful in middle-ear suppuration, as he had been able to recover it from aural discharges.

It seems probable, however, that there are two sources of fallacy in the results and deductions of these workers. First, they employed Hehner's sulphuric acid test, which does not differentiate between the drug hexamine and its decomposition product formaldehyde. Secondly, hexamine is not split up, and hence can be of no antiseptic value in any but an acid medium. Ear discharges and normal cerebro-spinal fluid are alkaline.

In view of these considerations the following investigation was undertaken. The first fallacy was obviated by the use of the Rimini-Burnam reaction, whereby formaldehyde can be detected in urine in a dilution of 1 in 150,000.

Three solutions are required:

- (1) $\frac{1}{2}$ per cent. solution of phenylhydrazine hydrochlor.
- (2) 5 per cent. solution of sodium nitro-prusside.
- (3) Saturated solution of caustic soda.

A small quantity of the fluid to be examined is placed in a test tube, and three or four drops of each of solutions 1 and 2 are added, then a few drops of solution 3 are poured down the side of the tube. A dark green colour indicates the presence of formaldehyde. Should the test prove negative, it is repeated with a fresh sample of the fluid which has been boiled with a few drops of sulphuric acid, when a positive result will show that hexamine was present.

As regards the second possible source of error, it was thought that if hexamine actually appeared in aural discharges its decomposition and consequently its antiseptic action could be favoured by the introduction of weak acids into the ear, just as intranasal lupus is treated by giving iodides by the mouth and applying hydrogen peroxide locally. It is known that in meningitis the reaction of cerebro-spinal fluid changes from alkaline to acid, a change which would appear to favour the action of hexamine.

Four untreated cases of suppurative otitis media were investigated, all the patients being children attending the ear and throat department of the Royal Hospital for Sick Children, Edinburgh. Local treatment was stopped. The hexamine was given by the mouth and in dilute solution. The fluids examined were: (1) Washings obtained by syringing the ear with a few cubic centimetres of distilled water, and (2) the urine.

CASE I.—H. H. Chronic otitis media dating from attack of scarlet fever a year ago. Large perforation. Much fetid pus. After 10 grains of hexamine, thrice daily for a week, the urine contained formaldehyde, the ear washings no formaldehyde and no hexamine. The dose was increased to 20 grains thrice daily, but had to be stopped in four days on account of pain on micturition and enuresis nocturna. Formaldehyde was present in quantity in urine, but no formaldehyde or hexamine in the ear washings.

CASE II.—L. B. Chronic otitis following measles two years ago. Membranes totally destroyed. Curdy fetid discharge. Ten grains of hexamine was given thrice a day for a week. The urine was then found to contain hexamine, but no formaldehyde; its reaction was neutral. The ear discharge showed neither hexamine nor formaldehyde. After 20 grains of hexamine thrice a day for a second week the results were exactly similar.

CASE III.—C. P. Chronic otitis for eighteen months. Small perforation. Profuse discharge. At the end of the first week, 10 grains of hexamine thrice daily, the urine contained formaldehyde. No hexamine or formaldehyde in aural discharge. At the end of second week (20 grains) these results were unaltered, but the patient had frequency of micturition.

CASE IV.—J. G. Discharge from right ear for three months. Small central perforation. Much muco-pus. Formaldehyde present in urine, but neither hexamine nor formaldehyde in the ear washings. Increase of the dose did not alter results.

It will be seen that hexamine or formaldehyde appeared in the urine in all cases, but in no case could either substance be detected in the aural discharge. The drug was given in fairly large doses, and symptoms of intolerance appeared in two of the cases.

With regard to the cerebro-spinal fluid, results appear to point to a similar conclusion, namely, that hexamine either does not make its way into this fluid at all or appears in such small quantity as to be of no therapeutic value. Intradural injections of hexamine may conceivably have some effect on the meninges near the site of injection,