

Two of these cases are of special interest, inasmuch as they are resections, not only of portions of the large intestine, but also of the small. Satisfactory accounts of these two were obtained on April 23rd.

I would reiterate that the operation of excision of a damaged portion of large intestine is by no means advocated as an alternative to suture, but as an expedient to which it is sometimes justifiable to resort. The narration of the above cases will show that they have all been of a severe type, and that two, indeed, have been double resections. The purpose of the paper is merely to show that caecostomy is a measure of safety in cases of resection, and that the latter operation is justifiable in a certain few cases of gunshot injury. These cases have been operated upon in an advanced clearing station, which in its operating theatre and in the heating arrangements of the wards bore the impress of the engineering and architectural abilities of its then commanding officer; but I have also been fortunate in enjoying the assistance of an anaesthetist and of operating theatre sisters of far more than ordinary skill.

Sir Harold Stiles has very kindly allowed me to make use of his name in connexion with this communication, and in a personal letter he writes: "Whenever I resect a carcinoma, an artificial anus, or a faecal fistula of the distal half of the large intestine, the last step in the operation consists, as a matter of routine, in stitching a small area of the caecum to the abdominal wall, so that a small opening can be made into it at the end of twenty-four or forty-eight hours." I very gratefully acknowledge my indebtedness to him for this valuable hint in surgical technique, for although I have usually made my opening in the caecum at the same time as the resection was performed, and although the minutiae of the actual operative procedure may differ, the idea I learnt in visits to Sir Harold at the Chalmers Hospital, Edinburgh.

For permission to use the notes of the military cases included in this paper I am indebted to Lieut.-Colonel E. F. L'Estrange, R.A.M.C.

THE LOCAL APPLICATION OF LIQUID GLUCOSE IN THE TREATMENT OF CERTAIN SUPER- FICIAL BACTERIAL INFECTIONS.

BY

T. H. C. BENIANS, F.R.C.S.ENG.,

PATHOLOGIST TO THE PRINCE OF WALES'S GENERAL HOSPITAL,
TOTTENHAM.

THE object of this note is to call attention to a method of treatment which in certain conditions that I have observed has produced very good results and which is perhaps deserving of wider use.

Glucose is in frequent use in the laboratory as a bacterial foodstuff, and its application to the site of an infection might at first seem not to be in the best interests of the infected host. But it may be that there are other ways of frustrating the ill effects of the invading bacteria than by their partial destruction with disinfectants. For instance, by altering the nature of the substrate on which they are acting, their products might be rendered less harmful; or the infected region might be made more suited as a nidus for some harmless organism which would then more easily displace the pathogenic one.

The following factors have to be considered to bring about an understanding of the principle which I have tried to exploit in the adoption of this method, and these will be the best guide to its use in any particular instance in which it may seem to be indicated.

1. Almost all pathogenic bacteria are capable of fermenting glucose, some of them, however, much more slowly than others.
2. During fermentation a definite acidity of the medium is produced.
3. Many of the bacterial toxic bodies, using the term in its widest sense, are formed to the greatest advantage in a definitely alkaline medium, and the production of these substances is in some cases distinctly inhibited by the presence of glucose; diphtheria toxin is an instance in point.
4. Stinking discharges are in most cases due to the tryptic digestion of proteins, and this is a form of enzyme

action which can only go on to advantage in an alkaline substrate, and which ceases in the presence of even a slight degree of acidity. This form of digestion, as it may be called, is analogous to that which goes on in the intestine with the formation, among other stinking bodies, of indol and skatol. The formation of indol by bacteria is said to entirely cease in the presence of a very small amount (0.25 per cent.) of glucose. That, as a matter of fact, I think, must depend on whether the particular bacteria ferment glucose rapidly or whether they first commence to digest the proteins. Certainly some bacteria, as, for instance, those causing the foul smell in ozaena, will produce a small amount of indol in the presence of considerable amounts (4 per cent.) of glucose.

Bearing these factors in mind we can briefly consider the clinical conditions in which I have tried this method, or seen it tried. In these infections the bacteria are carrying on their existence outside the body—that is, on the skin or mucous membrane, and not in the tissues themselves. In a sense these conditions are analogous to the "carrier" states with which we are familiar in certain other diseases, notably in meningococcus and diphtheria infections.

Bromidrosis.—This is a condition of stinking sweat, which, as I have shown, responds rapidly to the local application of glycerin.¹ I have as yet had only one opportunity of treating a case with glucose, but in this instance it was effective, as in those cases treated with glycerin.

Ozaena.—This condition of fetid rhinorrhoea is in most cases due to a massive infection of the nasal mucosa with a specific organism, the principal characteristic of which, as far as we are concerned here, is that it grows very freely in neutral broth, producing much indol and a very foul smell. It grows with difficulty in acid broth (+30 and upwards) and there is no smell and no production of indol. It grows fairly well in 4 per cent. glucose broth without any smell, and with a gradual production of acidity, and in this culture, as in the acid cultures, it rapidly dies out. A considerable number of cases of this condition have been treated by Mr. C. H. Hayton at my suggestion both with glycerin and with glucose, by swabbing over the mucosa of the nose once or twice daily with a 25 per cent. solution, with the result that the secretions of the nose have become acid, and the specific bacilli have been to a large extent, in some cases completely, killed out, and replaced by staphylococci and streptococci, the foul smell and the incrustation of the nose clearing up concurrently. I am at present only vouching for the principle of this method of treatment, which seems to hold the elements of success. The final results as to permanency of cure or mere alleviation of symptoms in these cases we hope to embody in a later paper. At present glycerin has given the better results, probably on account of its special physical properties; but it is difficult to obtain.

Chronic Otorrhoea.—Mr. Hayton tells me that he has treated several old-standing cases of this condition with success. Others who have tried the method in these cases say that they have seen no improvement. Obviously the mechanical conditions here may be totally different from those met with in a mere mucous membrane infection.

Chronic Vaginal Discharge.—At the Tottenham venereal clinic, in conjunction with Mr. E. Gillespie and Mr. F. L. Provis, I have had the opportunity of observing and treating a number of cases on this principle. Most of them were long-standing instances of persistent discharge not reacting to disinfectant douches. Some were known to be of gonococcal origin, in some there was no proof that they had had this infection at any time, and the condition seemed to be due more to the faulty anatomical conditions not uncommonly found in multiparae. The treatment was carried out by the patients themselves either by douching twice daily with a 25 per cent. solution of liquid glucose in warm water, or by the introduction nightly of a glucose pessary (25 per cent. glucose made up in a gelatin basis). We found in most cases that the purulent discharge rapidly diminished, in some cases it cleared up completely, and the vaginal secretions resumed their normal acid reaction. We are not prepared to assert that the condition can be cured by this means; some cases have relapsed after being clear some months since discontinuing treatment, some have not at present relapsed, but in any case to assert a

positive cure of a gonococcal condition is extremely hazardous. Moreover, in those cases where the anatomical conditions remain abnormal there must necessarily always be a tendency to an abnormal bacterial flora on the mucosa. Two things, however, admit of a positive statement: (1) That the patient's comfort has been increased by the diminution of the discharge; (2) that the normal acid reaction of the vagina has been restored.

In these infections of a mucous surface which, as I have said, seem to be analogous to certain other "carrier" conditions, it is highly probable that the likeliest means of cure lies, not in attempting to kill off the invaders completely lest some few escaping the killing process might find the place swept and garnished for them, but rather in attempting to restore the mucous surface to a condition in which its normal bacterial flora may multiply, and in course of time take entire possession of the field again.

In connexion with the treatment of vaginal discharge by the method advocated here, all one wishes to lay stress on is the fact of the diminution of the discharge; this most likely, though not absolutely certainly, marks a step in the right direction. Further work must show how this is effected; whether the mere acidity prevents the migration of the leucocytes through the mucosa, or whether the bacterial products that entice them out by their positive chemiotactic influence are not formed in the presence of the glucose medium I have not myself determined at present.

It needs only to be repeated that, in this as in any other form of treatment, one factor that is bound to condition success is a certainty that the medicament actually reaches the site of the infection.

REFERENCE.
¹ *Lancet*, December 5th, 1914.

THE INTRAVENOUS INJECTION OF EUSOL IN CHRONIC ARTHRITIS.

BY

HAROLD FAIRCLOUGH, M.B., B.S. DUNELM.,
HOUSE PHYSICIAN, DEVONSHIRE HOSPITAL, BUXTON.

It occurred to me that the chronic infections causing arthritis might be benefited by the intravenous injection of eusol. Fourteen cases have so far been treated; of these six were very much improved, four improved, and four were not affected. In a chronic complaint such as this it is very difficult to weigh the evidence as to the cause of the result obtained. There seems, however, little doubt that the improvement was in some of the cases directly due to the eusol.

An endeavour was made to get recent acute cases running a temperature and displaying evidence of toxic absorption. Some were, however, long-standing cases with an acute relapse. Cases are not sent to this hospital in the very early acute stage, when there is reason to think this treatment might be most beneficial. They were mostly cases that could not be classified as typically rheumatoid, and in which the source of infection was doubtful.

The solution used contains 0.5 per cent. free hypochlorous acid, and was prepared according to the receipt of James Graham, namely, 12.5 grams boric acid, and 12.5 grams chloride of lime are shaken up with 1 litre water, allowed to stand for some hours, filtered, and 8.5 grams of common salt added; dose, 100 c.cm.

CASE I.

R., aged 24, had had some pain and swelling of the right hand and wrist for six months, which spread to almost all the joints five weeks before admission. He was acutely ill in bed and was making no progress. He had irregular pyrexia up to 100°; a sore throat had started about the time of onset of the arthritis and had become much worse just previous to the time of the more acute attack. An attempt to cultivate an organism from the throat was not successful. The first injection of eusol improved his general condition very greatly. His throat was better by the next day and he began to eat for the first time for some months. He was given two more injections and made steady progress. On discharge his joints were all very much better; his right knee, however, contained fluid, but was painless. He could walk well with one stick. The temperature was normal.

CASE II.

P., aged 32, had had pain and swelling of ankles for at least four months, spreading to the knees, hips, back, shoulders, and

hands. When admitted he was confined to bed, unable to stand or walk. The knees and ankles were swollen, and in the metacarpophalangeal joint of the right thumb there was crepitus on movement. He had fairly widespread acne about the face. After the first injection the acne almost disappeared and the pains were slightly relieved. After the second the pains were much relieved, the swelling went down, and the acne entirely cleared up. He had one more injection and was discharged very much improved. He walked with one stick and his temperature was normal.

CASE III.

Clara G. During two years all joints had become gradually affected. Three months ago the right knee and ankle became acutely affected. On admission all joints were typically deformed and tender. There was evidence of thinning and destruction of cartilage, and some bony outgrowths. The right knee was acutely flexed and very tender, the ankle was also very swollen and tender. A skiagram of the right knee showed typical changes of septic arthritis. She had had acne of the face for three months and some pyorrhoea. After two injections she was greatly improved; her pain had gone except on movement, and the acne was very much better. The improvement in general health was also very marked. Under an anaesthetic the knee was straightened and put on extension. Her temperature rose and remained up for several days, but came down after a third injection. She had one further injection a week later. On discharge she was beginning to walk a little, suffered very little pain, and movement was returning in all her joints, even her wrists which had before been apparently fixed. The temperature was normal.

CASE IV.

J. C., aged 29; duration twenty months, gradual onset, second acute attack seven months before. On admission he walked with great difficulty with a stick. Fingers, wrists, feet, and knees were very tender, swollen, and with very limited movement. His mouth had twice been carefully overhauled, and was apparently healthy. He had an irregular temperature up to 100°. After the first injection he was considerably and immediately relieved, and the next day was walking about without a stick, and was better than he had been for over a year. A second injection was given, the joints steadily improved, and the disease appeared for the time quiescent. He could only stay three weeks, and was advised to return in two months. On readmission, his improvement had been fairly maintained, except for three days, during which he had acute pain. His wrists were both swollen and tender, and the left was almost fixed. He was given four injections of eusol, and made steady progress. On discharge he could run, although clumsily; he had no pain, and had better movement at all joints, though these continued to be swollen. The temperature was normal.

The above cases all did very well; their improvement was immediate and definite, and apparently due to the treatment employed. The following two cases were quite uninfluenced by the injections:

CASE V.

Dorothy L., aged 19; duration eight months, gradual onset. Acute attack in bed until admission. All joints were very tender; there was great muscular wasting. She was very anaemic, and had slight irregular pyrexia. An organism was cultivated from the gums, and a vaccine prepared, but she did not appear to respond to it, and was decidedly not improving. After five doses she was given an injection of eusol (80 c.cm.). The temperature rose to 102°; ten days later she had a second injection, and the temperature rose to 103°. She afterwards appeared to make some progress, and complained less of pain; her general condition seemed better, but the temperature continued to be elevated. It was thought she might now be in a better condition to respond to vaccine treatment, and further doses were given, but without definite result. A third injection three weeks later met with no better result. On discharge her joints were a little less tender, but she was not able to walk any better, and the disease did not appear to have been checked at all.

CASE VI.

R. E., aged 35; duration five years. He had had more frequent attacks during the last two years, and had been ill the last nine months. On admission he looked pale, thin, and ill; the fingers and wrists were mostly affected; the joints were hot and turned slightly red when very painful. He had had artificial teeth for the last six years. The temperature rose to 99.4° at night. He was given four injections of eusol, but without any relief, and was then put on a stock streptococcal vaccine. He was finally discharged only very slightly improved.

These two cases were more typical of rheumatoid arthritis than any of the others. This is of interest, as other observers have found that cases of septicaemia due to streptococci have not responded to eusol so well as those due to other organisms.

The remaining cases do not afford any conclusive evidence; two more were very much improved on discharge, four were improved quite definitely, and, in addition to the last two given in detail, two more were not benefited. Those who have done well have shown this not only by an improvement in the joint conditions and in general