

operation table followed by recovery that I ever remember to have seen. In both, the patient received  $\frac{1}{4}$  of a grain of strychnine by subcutaneous injection, yet neither of them ever exhibited the slightest indication of poisoning. In the second case, recovery from shock had taken place some hours previous to the fatal termination, and the cause of the somewhat sudden collapse must remain uncertain. I was inclined at the time to attribute it to a reactionary hæmorrhage.

I have quoted these cases in full as examples of the conditions under which I would advocate the administration of very large doses. They are the only two instances in which I have given so much as a quarter of a grain of the drug. Whilst resident at the Leeds Infirmary I gave hypodermic injections of twenty minims on four occasions after amputations for railway smash; twice I gave 15 minims after hip-joint amputation, and the same dose in five cases of shock combined with severe hæmorrhage. One railway case, a double amputation, died in eight hours; one hip amputation died in sixteen hours; the rest recovered. The cases associated with hæmorrhage showed very little response to the drug, and only one recovered. Two of these, however, were suffering from visceral injuries. None of the cases ever showed the slightest symptoms of poisoning. In some of the cases the drug was given in two separate doses, but in none was there a longer interval than half-an-hour between the two injections. The cases of pure shock rallied remarkably under the influence of the drug. Of these, the following case is a good instance:—

*Railway Smash: Double Amputation of the Legs: Shock: Injection of  $\frac{1}{4}$  gr. of Strychnine: Recovery.*—In October, 1896, a goods guard was admitted into the Leeds Infirmary under the care of Mr. Moynihan, to whom I am indebted for permission to publish the case. A railway truck had passed over both legs. He was in a state of shock, having travelled some distance by train. Whilst Mr. Moynihan amputated the right leg above the condyles, the left was simultaneously removed by myself immediately below the knee. Ten minims of strychnine were injected whilst the patient was on the table, and a second 10 minims on his arriving in the ward. In two hours it was difficult to believe that he had so recently undergone a double amputation.

It is not, however, the proportion of recoveries that I wish to emphasise, although, looking back on the cases, I feel confident that without strychnine it would have been a smaller one. Judging, however, from the small number of cases I have treated in this manner, it seems certain that the human body, when suffering from profound shock, will endure very large doses of strychnine not only without ill-effect, but actually with benefit, and I feel convinced that when given boldly it is a most powerful remedy.

I do not for one moment wish to advocate that  $\frac{1}{4}$  or  $\frac{1}{2}$  gr. of strychnine should be given in every case of shock, but I hold that the drug should be given boldly and fearlessly, and repeated without hesitation where rallying does not quickly take place. It is in those cases where shock is present in its severest form that I would give the larger doses; where we find cold extremities, extreme pallor, widely dilated pupils, a failing respiration and imperceptible pulse; where, in short, a speedy death appears inevitable. On the other hand, where strychnine is indicated at all, I believe it is futile to give less than  $\frac{1}{10}$  gr.

It is especially in those cases where respiration fails that one would expect the effects of the drug to be most marked. In most of the cases, however, I have noted a remarkable improvement in the pulse, apart from the respiratory movements. So much has this been the case, that I have come to regard the beneficial effect as chiefly due to the drug's action upon the vasomotor mechanism. This view seems to be strengthened by the fact that where large loss of blood has previously occurred, response to the drug has not been marked.

The tolerance, under certain conditions of the body, for large doses of strychnine has been demonstrated by Mueller,<sup>2</sup> who put forward the drug as an antidote for snake poison. He advocated injections of 15 to 25 minims in adults, and Dr. Banerjee published eight successful cases in support of its value. The matter was subsequently investigated by Elliot,<sup>3</sup> who by a series of experiments on animals showed that in many cases it actually seemed to hasten death rather than retard it. The fatal result seems to be largely due to the fact that the drug, "by increasing the force and frequency of the circulation aids in the diffusion of the virus." In these cases it seems, on the whole, that strychnine, whilst being in no

sense an antidote, nevertheless combats the state of collapse, and that when this is marked, large doses are easily borne.

The vascular theory of shock put forward by Fischer and Schneider has recently been strengthened by the experiments of Dr. Crile,<sup>4</sup> who has demonstrated that failure of the vasomotor mechanism is the principal factor in the production of shock. He has shown that in severe and fatal cases there is an almost complete paralysis of the vessel walls. He advocates the use of small doses of strychnine, frequently repeated, together with saline infusions. Such a line of treatment in any given case may probably achieve the same result as the administration of one full dose. But in cases of sudden and severe shock the time for successful action is often too short to allow of the frequent repetition he advises. Moreover, it is difficult to see what especial advantage there is in two small doses over one large one. Patients suffering from severe shock will tolerate 10 to 15 minims without exhibiting any symptoms. I quite recognise that the administration of larger doses than this incurs a serious responsibility, but whilst bearing this in mind I should not hesitate to go further where rallying did not quickly take place.

In conclusion, therefore, I would urge a bolder and more systematic use of the drug, and feel confident that such a course will be followed by improved results. The mortality from shock must always remain considerable so long as we are unable to increase what has been called "man's vital capacity for surgical interference." The most we can hope to do, therefore, is to reduce the mortality to its smallest proportions, and this we are likely to accomplish by adopting a more hopeful attitude and a more energetic treatment than heretofore.

## REFERENCES.

- <sup>1</sup> *Lettsomian Lectures*, 1894. <sup>2</sup> Mueller, *On Snake Poison and its Antidote*, 1893. <sup>3</sup> *Trans. South Indian Branch of British Medical Association*, 1894. <sup>4</sup> Crile, *An Experimental Research into Surgical Shock*, *Curtwright Prize Essay*, 1897.

## THE RELATION OF BACILLUS COLI COMMUNIS TO OTHER ORGANISMS IN THE URINE.

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WITH REMARKS BY

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THERE are many points in the mode of invasion of the urinary tract by microbes which still require elucidation. In the discussion on this subject which took place in Edinburgh last year<sup>1</sup> a marked difference of opinion existed as to the kind of micro-organisms which were most commonly found in the urinary tract. The French school, headed by Guyon, has always maintained that the bacillus coli communis was almost invariably present, whilst Melchior, Rovsing, Moullin, and others have stated that other infective organisms were often found. When taking part in that discussion I pointed out that it was extremely probable that these different statements depended on the stage of the cystitis at which the observations were made, and that in cases which at first teemed with staphylococci or streptococci, these organisms might entirely disappear and be replaced by the colon bacillus.

Some doubt was expressed as to whether this was possible, and accordingly Mr. Maxwell has at my suggestion undertaken the following series of experiments with a view to confirming or disproving my statements. I do not of course for one moment wish to contend that bacillus coli is never a primary cause of infection. In women especially I am sure that this often occurs; but there is good reason for believing that any part of the urinary tract which is infected by cocci soon attracts the more vigorous colon bacillus, and the cocci are speedily ousted.

In order to indicate the kind of case which has been selected with a view to testing points just referred to, a short clinical history of each case has been appended. The actual pathological work has been carried out by Mr. Maxwell in the St. Bartholomew's Hospital pathological laboratory. Though not very numerous so far as the cases themselves are concerned, the number of experiments was very considerable.

It is only possible here to describe the general conclusions to be drawn, and the mode by which they have been arrived at. So far as they go, they completely support the view brought forward by me in Edinburgh last year. Both Mr. Maxwell and myself are desirous of expressing our indebtedness to Dr. Andrewes for his kind help and many excellent suggestions, without which it would have been impossible to bring the work to a satisfactory conclusion.

The methods which were employed in this investigation were as follows:

In all the cases described in this paper the urine was drawn off with a boiled soft rubber catheter, or else a boiled silver catheter; the meatus urinarius was washed with soap and water, and an antiseptic lotion. The catheter, until required for immediate use, was put in sterilised water, and the manipulator's hands prepared as for a surgical operation. The urine was caught in a sterilised test tube, the first portion escaping from the catheter being rejected. Cultures were made directly from the urine, no centrifugalising process being used. Cultures were made directly into nutrient broth and milk tubes, and surface cultures on sloped agar-agar and gelatine tubes. From the latter subcultures on agar or gelatine tubes and gelatine shake cultures were made. Agar or gelatine plates were used when the organisms appeared to be multiple. The cultures were examined fresh, and their reaction with Gram's stain tested. With regard to the reliability of this simple method of drawing off the urine for examination without the use of Melchior's or other complicated catheters, all I can say is that, having tried it frequently on patients whose urine was expected to be sterile, I have never succeeded in growing organisms from their urine, with one exception, in which, what was apparently an air infection of *Sarcina lutea* occurred at the upper end of the culture tube.

CASE I.—R. L., 63. Urinary trouble for two years or more; when admitted had to pass water about every hour or oftener. Urine foul, 1030, alkaline; albumen and pus; prostate enlarged. July 8th, 1898. Urine contained streptococcus pyogenes albus and bacillus coli communis in small quantity. August 5th. Bacillus coli alone. August 17th. Bacillus coli chiefly, also bacillus pyocyaneus, probably from accidental contamination.

CASE II.—J. G., 52. Pain and difficulty in micturition for about six hours. Had had catheters passed. Prostate hard and nodular, probably carcinoma; had passed blood on several occasions. Urine acid, 1024. Enormous quantity of bacilli. Bacillus coli communis formed the great mass of the bacilli present. There was also present in very small quantity a large diplococcus that retained the stain on staining by Gram's method, and may possibly have been a urethral organism contaminating the urine.

CASE III.—J. P., 67, admitted August 3rd, died August 13th, 1898. History of three years' painful and difficult micturition. Self-catheterisation past two years. Three months ago acute attack of cystitis, which improved under benzoate of ammonia; a second attack four days before admission. Prostate a good deal enlarged. Urine very foul, 1015, albumen, much pus. Got steadily worse, refused operation, and died ten days after admission. The bladder was small and contracted; a sacculle containing several calculi communicated with it. Ureters and kidney calyces were dilated and contained pus. *Bacteriological Examination*.—August 3rd: Bacillus coli communis and bacillus proteus vulgaris. August 13th. Same forms present. At the *post-mortem* examination fluid, taken from the calyces of the kidneys contained the same bacilli.

CASE IV.—J. A., 71, admitted October 8th, died October 24th, 1898. *History*.—A year of urinary trouble; frequent catheterisation; acute cystitis last fortnight, accompanied by a good deal of pain and bleeding. Prostate enlarged. Urine 1010, ammoniacal pus and blood. Suprapubic cystotomy. Carcinomatous growth in bladder, in addition to enlarged prostate. *Bacteriological Examination*.—Pure culture of bacillus coli communis.

CASE V.—J. P., 52. Stricture 6 years previously; much neglected. Wheelhouse's operation performed. Urine 1016, ammoniacal; trace of albumen, pus, and triple phosphates. *Bacteriological Examination*.—January 17th, 1899. Urine drawn by suprapubic aspiration, contained bacillus coli communis and bacillus proteus vulgaris. January 31st: Urine drawn by silver catheter; contained same bacilli, but the B. proteus was much diminished in quantity.

CASE VI.—H. L., 28, admitted with prolapsed semigangrenous piles, which were reduced under an anæsthetic, and operated on later. Suffered from retention immediately after admission. Had never had a catheter passed, or suffered from venereal disease. Urine alkaline, 1024, contained blood and pus. Rapidly recovered from the cystitis as the rectal trouble cleared up. *Bacteriological Examination*.—Pure culture of bacillus coli communis.

CASE VII.—J. M., 20. Admitted with a fracture dislocation at level of the 11th or 12th dorsal vertebra. During his stay in hospital of nearly three months had two attacks of cystitis, which cleared up under treatment. Urine 1028, ammoniacal; contained pus, blood, and abundantropy mucus. *Bacteriological Examination*.—January 20th, staphylococcus albus (first attack); February 18th, staphylococcus albus (second attack).

CASE VIII.—A. T., 35. Extruterine pregnancy. Operation. Large abscess cavity closely bound down by great omentum; contained about 2 pints of pus and a decomposing foetus. Admitted July 2nd; discharged December 28th, 1898. *Bacteriological Examination of Pus*.—July 9th, 1898:

Pus teemed with streptococci and staphylococci of various sizes, and also contained bacillus coli, but in small amount. August 15th: Streptococci and staphylococci present in small proportion. The principal organism is now bacillus coli, with a slight secondary infection of bacillus pyocyaneus. September 26th: No cocci present. Bacillus coli the predominant organism. Bacillus pyocyaneus present in very small quantity.

*General Conclusions*.—In only one case of cystitis has the bacillus coli communis been actually noticed to supplant the cocci which were present in an earlier stage of the disease (namely, in Case I), but in this instance the supplanting of the one organism by the other was a regular and gradual process. The same gradual disappearance of cocci was, however, equally well marked, namely, in Case VIII (extruterine pregnancy). Cocci were present in great quantity at the time of operation, but were soon supplanted by B. coli. In Case V, where bacillus coli and B. proteus vulgaris were present when the case first came under observation, B. coli soon became the predominant partner, and would in all probability, had the case been under observation a little longer, have soon become the sole occupant of the urine, and eventually have disappeared altogether.

Case VII had two attacks of staphylococcus infection, but they yielded to treatment so soon that B. coli did not presumably have time to make its appearance.

Another case (VI), which suffered from gangrenous piles, exhibited B. coli before any catheter had been passed, and it is most probable that infection took place directly from one viscus to another, owing to the passage of the bacilli through the intervening tissues.

The remaining cases only came under observation at a comparatively late stage in the course of the disease, and they all contained B. coli. It is exceedingly probable that some of them at any rate would have yielded cocci in their earlier stages, and this is borne out by their histories, which state thatropy mucus was present at the onset in nearly all of them, and this condition is nearly always associated with infection by cocci.

## REFERENCE.

1 BRITISH MEDICAL JOURNAL, 1898, vol. ii, p. 1302, et seq.

## MEMORANDA:

### MEDICAL, SURGICAL, OBSTETRICAL, THERAPEUTICAL, PATHOLOGICAL, Etc.

#### A METHOD FOR THE REMOVAL OF FOREIGN BODIES FROM THE NOSE AND EAR.

HAVING experienced some difficulty on more than one occasion when attempting to remove foreign bodies from the nose and ear, it occurred to me that another and more simple method must be devised, for the recognised methods—at all events in my hands—left much to be desired, and did not always prove satisfactory.

It seemed to me that the principle of suction would obviate the difficulties of grasping with forceps or a snare a smooth and slippery body, and of getting behind with the blunt hook or a stream of lotion those bodies which completely, or almost completely, filled the lumen of the auditory and nasal passages.

After making trials of several kinds of apparatus, I found that the simplest is the best. It consists of a piece of india-rubber tubing, rather less in diameter than an ordinary lead pencil, and varying in length from 1 to 3 inches, according to the distance of the foreign body from the surface, attached to the nozzle of a brass syringe. The presence and approximate situation of the body having been ascertained, the tubing attached to the syringe is passed into the nostril or meatus, as the case may be, and brought into contact with the foreign body. The piston of the syringe is then pulled out for a sufficient distance to create a vacuum in the tubing, and thus to draw the foreign body into or against its free end. The syringe is then withdrawn, and with it the foreign body attached to the tubing. In some cases I have found it advantageous to dip the tubing into glycerine before inserting it; this diminishes the chance of air entering the tubing between it and the foreign body.

In this way I have, experimentally and in the course of practice, removed a large variety of foreign bodies, such as