A METHOD FOR EFFICIENT DRAINAGE OF THE KNEE-JOINT.

BY

COLONEL A. W. MAYO-ROBSON, C.V.O., C.B., A.M.S.,
CONSULTING SURGEON, SOUTHERN COMMAND.

It will be generally conceded that, whether in civil or military practice, septic inflammation of the knee-joint is one of the most serious and anxious conditions that the surgeon can be called on to treat, involving as it does dangers both to limb and life.

The chief danger arises from the character and shape of the knee-joint with its various recesses and pouches, rendering efficient drainage in the ordinary position absolutely impossible.

With the limb in the usual dorsal position, the deepest part of the synovial cavity is in front of the popliteal space, much below the level of the suprapatellar pouch. Drainage is at present practically always effected by inserting a tube or tubes into the pouch above the patella, leaving much of the septic contents of the joint behind and between the femur and tibia with a tendency to make a way for itself to the surface by burrowing backwards into the popliteal space or along the course of the tendons in that region, upwards into the thigh, and downwards into the leg, or in both directions; this at the same time leads to septic absorption and blood poisoning from the imperfectly evacuated joint. Thus, in order to save life, the limb or the joint has not infrequently to be sacrificed.

Now, by changing the position of the limb, it is possible to make the suprapatellar pouch the dependent part of the joint, when by the very simple operation of inserting a tube into the top of the pouch the whole joint can be completely evacuated and purified, and if this is done sufficiently early, a speedy recovery may be anticipated with the joint mobility unimpaired.

Two changes of position will make the suprapatellar pouch dependent:

- (a) The vertical position of the limb at right angles to the body with the patient in the dorsal decubitus, or
- (b) The prone position of the body with the foot of the bed well raised.

In both positions the limb must be efficiently fixed on a splint, as fixation in inflammation of the knee-joint is only second in importance to drainage.

The first position can be easily maintained by a horizontal bar of wood arranged over the top of the bed, to which the limb is suspended by a pulley and weight. In this position dressings are easily carried out without moving the limb, and the pulley and weight enable the patient to be raised in bed for the use of the bedpan without pain or disturbance of the joint or dressings.

If for any reason the vertical position is inconvenient or difficult to carry out, the prone position can be adopted, the foot of the bed being raised and the limb slung from above by pulleys and weights for the thigh and leg.

This position also makes the suprapatellar pouch the dependent part of the articulation, and enables the joint to be completely evacuated of its fluid contents through a tube inserted a little way into that pouch.

As the prone position is irksome if prolonged, the patient, when once the joint has been emptied, may, if necessary, be turned on to his back, and the prone position adopted for from half an hour to an hour every four hours at first, and later about three times in the day, until the drain can be dispensed with.

When once the joint has been thoroughly evacuated of its septic contents, and if needful gently washed out with warm normal saline solution, the synovial membrane of the knee, like the peritoneum, is capable of taking care of itself. Long-continued drainage is very seldom required, and usually a movable joint will be obtained.

THE Minister of Munitions has added acetic acid of all strengths to the war material to which Regulation 30 A of the Defence of the Realm Regulations applies. Inquiries regarding this order should be addressed to the Director, Chemical Section, Trench Warfare Supply Department, St. Ermin's Hotel, Westminster, S.W.1.

FIVE HUNDRED CONSECUTIVE CASES OF ACUTE GONORRHOEA TREATED WITH VACCINES;

AND

A NOTE ON THE ELECTRO-CHEMICAL METHOD.

BY

N. P. L. LUMB, CAPTAIN R.A.M.C.

AFTER treating a large number of cases of gonorrhoea, it seemed that the only way of eradicating the disease was to attack it through the blood, in the same way as with salvarsan in syphilis. The administration of many thousand injections of a particular stock vaccine (Staphgon) prepared at this hospital brought to light one most encouraging fact, namely, the appearance of a visible discharge from the urethra or signs in the urine shortly after the injection of a moderate dose when the cure was not complete, or in other words, when the patient was not free from active gonorrhoea. This is referred to in Colonel Harrison's manual on the subject as one test of cure, and in my experience it has proved very valuable.

The return of the discharge can only be due to gonococci reappearing at the surface of the urethral mucous membrane, and it is reasonable to suppose that the vaccine has reached them through the blood stream, rendered them uncomfortable, so causing their migration from the deeper tissues to the surface. This, then, is a means of attacking the gonococci through the blood stream in the acute stage of the disease, and of penetrating tissues which the irrigating fluid cannot reach. By giving suitable doses of vaccine the hostility of the blood is increased to a maximum, whilst irrigation washes away the inflammatory products. The administration of a vaccine as a routine form of treatment in the acute stage of gonorrhoea has not up to the present been generally adopted, and I have thought it worth while to bring the results to notice. Both in regard to dosage and the period of time between successive injections experimental evidence had to be accumulated, and the effect produced by varying these two factors was observed in several hundred cases before finally deciding in favour of the method now to be described, which differs considerably from that usually adopted in the chronic stage.

REPORT ON FIRST FIFTY CASES.

The results of the first series of fifty consecutive cases are quoted below. Most of the cases to be dealt with have been severe, and, owing to the circumstances in which the disease has been contracted, the patients have not reported until obliged to do so. In nearly every case there has been a discharge for at least a week before any local treatment has been commenced, and the disease consequently well established. Briefly, the pathological condition in such cases is that the gonococci have invaded the greater part of the urethra and are no longer on the surface alone, whence they can be washed out by an irrigating fluid, but have penetrated the mucous membrane and lie below the surface, as well as in the glands of Littre and the various lacunae. Once this has occurred it becomes a matter of much greater difficulty to eradicate the disease, for the irrigating fluids merely wash away the accumulated discharge and do not penetrate into these side-channels of the urethra, within which the organisms remain indefinitely. The discharge may disappear entirely under ordinary conditions of living, only to return if the patient take a considerable amount of exercise or indulge in alcohol. This is due to a reinfection of the urethra by gonococci from these glands.

The rationale of the method described is as follows:

1. To affect the blood as early as possible, with a view to
 - a. Antagonizing the gonococcus,
 - b. Diminishing the likelihood of complications.
2. To get as big an action as possible in the shortest time without inducing a negative phase.

It has been proved by the work of Eyre and Stewart and others that a gonococcal vaccine increases the power of the blood to destroy the living organisms, and that one positive phase can be superimposed upon another by giving suitable injections at the proper intervals, thereby obtaining the maximum effects.

In utilizing this fact two main lines of treatment were adopted:

1. Intensive dosage with a mixed stock vaccine (Staph-gon) containing 20 million gonococci and 50 million staphylococci per c.cm.

2. Weak irrigations on Janet's system.

I have called the dosage intensive because the amounts given are considerably larger and the intervals between them considerably shorter than has hitherto been the case in vaccine therapy. Three injections are given within the first five days, the total number of gonococci injected in that period being 60 million and 150 million staphylococci. It is believed that by adhering to this scheme a series of positive phases is actually imposed one upon the other, thus producing the maximum effect.

Irrigation is commenced with a weak solution of potassium permanganate (1 in 8,000) and then replaced by 1 in 6,000. This strength is not exceeded without special reason. In all but a few cases it is found to be sufficiently strong, and, whilst washing out the urethra efficiently, it neither irritates nor injures the mucous membrane.

Method.

On the first morning after admission a two-glass urine test is made, the urine of six or seven hours being passed into two conical glasses on rising in the morning. About four ounces are passed into one glass and the remainder of the bladder contents into the second one. The patient stays in bed for the first three days, getting up only to irrigate in the morning and again in the afternoon. Milk diet is ordered and an unlimited quantity of barley water allowed. Aperients are given regularly as necessary to keep the bowels freely open. Irrigation is commenced with 1 in 8,000 potassium permanganate on Janet's system, the container being placed 5 ft. above the patient, who is instructed to thoroughly wash out the anterior urethra first and then to get the solution into the bladder. A dose of 5 million gonococci is given on the first morning, and urotropine, according to the following formula, for five days.

R. Urotropine ...	...	...	...	gr. x
Aq. ...	...	...	ad	3 j
R. Ac. sod. phosphat. ...	...	...	...	gr. xx
Potass. citrat. ...	...	...	...	gr. x
Syr. aurant. ...	...	...	...	ss.
Inf. buchu ...	...	...	ad	3 j

Dose: One ounce of each, mixed just before taking, three times a day.

On the second day irrigation is carried out morning and afternoon as before, and the vaccine is given again on the third morning, the dose being 10 million. By the fourth day the discharge in most acute cases has diminished to a small drop and the patient is allowed to get up and go about as usual, taking a moderate amount of exercise. He now irrigates with 1 in 6,000 potassium permanganate and the diet becomes an ordinary one, except that fish or a small quantity of meat is allowed, alcohol and condiments being forbidden. On the morning after getting up a four-glass urine test is made and used as the guide in further treatment. On the fifth day the medicine is stopped and another dose (50 million) of gonococci given, irrigation being continued as before. The patient then passes a two-glass urine test, as already described, on alternate days and the treatment is modified as considered necessary. On the ninth day he receives a second dose of 50 million gonococci, and a bougie is passed on the tenth day, the urethra being massaged if the glands are involved. The bougie at this stage is valuable in three ways:

1. It allows the massage of Littre's glands.
2. It reveals any tendency to stricture.
3. It has a stimulating effect on the mucous membrane.

On the thirteenth day a third dose of 50 million is given, and by the sixteenth day, when it is again repeated, the discharge has almost invariably ceased. The urine in both glasses is clear, though the first one may still contain a few flakes. The patient at this stage is taking as much exercise as possible, playing games every afternoon and eating a full diet. If under these conditions no discharge be apparent, the irrigation is changed to 1 in 1,000 zinc sulphate or 1 in 4,000 zinc permanganate for two or three days, and then all treatment stopped. The urine is examined as before and a final dose of 50 million gonococci given two or three days after all treatment has ceased. If the patient be not free from active gonorrhoea, this "provocative" dose invariably gives rise to signs in the urine, or an obvious discharge, within twenty-four hours, and this is a most valuable test. If the urine remain clear after this, the case is watched for another three days and then considered clear.

Results.

In the first series of 50 cases so treated 37 have been discharged with an average duration of twenty-two days in hospital (that is 74 per cent.). Of the remaining 13, 6 were complicated by pus in the prostate and one with epididymitis.

A certain proportion (13 out of 50, that is, 26 per cent. in the series) do not clear up in so short a time. This is what one would expect and is generally due to one of the common complications. Epididymitis and prostatitis accounted for 7 out of the 13 in the series. In these the complications are treated on the usual lines, vaccine treatment being continued. In some other cases doses of 100 million have been given at this stage with very satisfactory results. In all the complications of gonorrhoea this vaccine has given equally good results, and but a small proportion of early cases, treated with it from the time of admission, have developed prostatitis or epididymitis.

Epididymitis.—A large number of cases develop this condition before admission, but the testicle rapidly becomes normal under local treatment combined with vaccines. Two or three patients who had suffered from the same trouble in years gone by spontaneously remarked that the testicle which had always remained enlarged had, since the vaccine, assumed its normal size. The average duration of the first 11 cases treated on this plan was twenty-four days.

Periurethral Abscess.—In this condition the vaccine has proved of considerable value in helping to free the enlarged and infected glands from discharge and, at the same time, reducing the infiltration along the whole urethra which so frequently renders it like an atheromatous artery in consistence.

Arthritis.—Excellent results have been obtained. Four acute cases have been treated and all have recovered with perfect movement. One of them, who was unable to stand, was affected in the hips, knees, and ankles. He left hospital after seven weeks with perfect movement in every joint and was able to proceed direct to his unit at the front.

General Effects on the Patient.

These come under four main groups:

1. Mental relief at the rapid disappearance of the discharge.
2. Rapid disappearance of pain on micturition.
3. Rapid disappearance of pain on irrigation.
4. Exercise can be taken without delaying the cure.

The mental state of the gonorrhoea patient is very important, and anything which tends to turn his thoughts away from the site of the disease and associated ideas is valuable. The actual injections tend to do this, but far more valuable is the rapid diminution in discharge, which convinces the patient that he really is getting over the attack.

Pain on micturition and during irrigation speedily disappears, considerably increasing the patient's comfort, whilst he can lead an ordinary life and take plenty of exercise without delaying his recovery. No relapses have to be recorded so far, though nearly every case has returned direct to duty at the front.

REPORT ON FIVE HUNDRED CASES.

The foregoing report, prepared some months ago, contains the results of fifty consecutive cases treated with vaccines on the plan outlined therein. But with such a comparatively small number of cases no final decision was justifiable as to the value of the method, and it was decided to continue the investigation. Five hundred consecutive cases have now been collected, acute ones only being included, and in most of them ten to thirty days had elapsed before receiving any treatment. No selection was made and each case was added to the list on commencing treatment, any complications developed and the number of days under treatment being added on completion of attendance. The relapse rate was accurately available, because of the fact that all relapses were returned for readmission to the same hospital.

Revised Method.

A modification has been introduced in the dosage and also in the frequency of the injections, though the number of days between each remains the same. It was found that an initial dose of 50 million gonococci could be given without serious reaction, and double this dose on the third day; this plan was adopted throughout. On admission a dose of 1 c.cm. (50 million gonococci, 150 million staphylococci) is given, and 2 c.cm. on the third day. The third injection is given on the sixth day, the dose remaining the same, and a similar injection on the ninth day; two more doses of 2 c.cm. given on the twelfth and fifteenth days complete the first course. No further injections are then given for ten days. At the end of that period a second

course of six injections may be commenced, the dose remaining at 2 c.cm., and the interval between each injection being two clear days. Table I shows this in detail.

TABLE I.

<i>First Course:</i>				
First day	...	...	...	1 c.cm.*
Third day	...	...	...	2 c.cm.
Sixth day	...	...	...	2 c.cm.
Ninth day	...	...	...	2 c.cm.
Twelfth day	...	...	...	2 c.cm.
Fifteenth day	...	...	...	2 c.cm.
<i>Second Course:</i>				
Twenty-fifth day	...	...	...	2 c.cm.
Twenty-eighth day	...	...	...	2 c.cm.
Thirty-first day	...	...	...	2 c.cm.
Thirty-fourth day	...	...	...	2 c.cm.
Thirty-seventh day	...	...	...	2 c.cm.
Fortieth day	...	...	...	2 c.cm.

* = 50 million gonococci.

Many cases require one course only, others two, the latter particularly when complications are present. At the end of the first course of vaccines the two-glass urine test usually shows that the patient is practically free from discharge, apart from a little muco-purulent secretion in the morning. Irrigation is continued until nothing is seen at any time, even after vigorous exercise, and then stopped altogether. The test dose of vaccine (100 millions) is given, and the urine examined for six or seven days afterwards. If no discharge reappears the patient is considered to be clear. Owing to existing circumstances it has not been practicable to examine urethroscopically every patient before leaving hospital, but in a considerable number this was done. With regard to the second course, it should be made clear that the whole of the six injections are frequently not required. When the urine is free from flakes and no discharge is seen at any time, irrigation is stopped and the test dose of vaccine applied. Should a discharge reappear, indicating that the disease has not been eradicated, the remaining number of vaccines to complete the six is given, and then a second interval of ten days allowed to elapse. Irrigation and local treatment have been carried out in accordance with the original scheme.

Results.

The results of 500 consecutive cases are given in Table II with details of the different complications and the number of days under treatment. It will be seen that 222, or roughly 44 per cent. of the cases, were complicated. This is accounted for by two factors: (1) Active service; (2) lateness in reporting.

A patient contracting gonorrhoea often does not realize the condition until the discharge is profuse, and during that time a spell of hard work will do much harm. Also a number delay reporting to the medical officer in the hope that the discharge will disappear. Thus of 101 epididymitis cases in the series of 500 acute cases 70 were present on admission and 8 of the 10 arthritis cases. Of the prostatitis cases the exact number present on admission cannot be stated, since routine examination of the prostate was not carried out until the end of the second week of treatment.

An analysis of the uncomplicated cases shows that 60 per cent. were under treatment thirty days or less, with an average of nineteen days. The average duration for the whole of the uncomplicated cases (278) was thirty-five days, or five weeks.

The complicated cases show clearly the importance of thorough treatment of the prostate, the cases of prostatitis requiring, on an average, ten days longer than those of arthritis, and twenty-two days longer than those of epididymitis. The longest cases of all were those in which acute prostatitis was followed by acute epididymitis, this group forming 3 per cent. of the total. The average stay of all complicated cases was fifty-two days, or several days under two months.

It has from time to time been suggested, though never with adequate proof, that vaccines are dangerous in the acute stage, and lead to complications. If this were so it would have been expected that in this series of 500 acute cases, all treated from the start with big doses, a large proportion of complications would have developed, especially epididymitis and arthritis. This is not the case.

Of the 101 epididymitis cases 70 were present on admission, leaving 31 developed out of 430 cases, that is, 7 per cent.

Of the 10 arthritis cases 8 were present on admission, leaving 2 developed out of 490 cases, that is, less than 1 per cent.

The most remarkable feature of all is the exceptionally low percentage of relapses. Out of the 500 cases two only

have occurred during a period of four months after completion of the series. Many of the cases left hospital more than six months ago. This gives a relapse rate of less than 1 per cent. It is a very satisfactory proof of the value of vaccines as a test of cure, and although by omitting it the number of days under treatment could be reduced in many instances, the relapse rate would very soon counter-balance any gain. At the present time everything possible has to be done to minimize the number of relapses of gonorrhoea cases, and this system has been found, in actual practice, to be far in advance of any other; whilst the number of days under treatment compares favourably with any known figures.

TABLE II.—Results of 500 Consecutive Cases treated with Vaccines in the Acute Stage.

Number of uncomplicated cases	...	278
Number of complicated cases	...	222
Average number of days in hospital (all cases)	...	43
<i>Uncomplicated cases 278, made up as follows:</i>		
Under treatment 30 days or less	...	157*
(Average 19 days)		
Under treatment 31 days or more	...	121
(Average 55 days)		
<i>Complicated cases 222, made up as follows:</i>		
Epididymitis	...	101
(Average 38 days)		
Prostatitis	...	94
(Average 60 days)		
Arthritis	...	10
(Average 50 days)		
Acute prostatitis and epididymitis	...	17
(Average 86 days)		
Average stay of all uncomplicated cases	...	35 days
Average stay of all complicated cases	...	52 days
Number of cases relapsing (four to six months after completion of treatment)	...	2†

* That is, 60 per cent. discharged with an average of 19 days.

† That is, less than 1 per cent.

A NOTE ON THE ELECTRO-CHEMICAL TREATMENT OF GONORRHOEA.

This form of treatment seemed to offer some hope of success, and since it has recently been brought into prominence by one or two writers, it may be of interest to record the results obtained.

The method adopted was similar to that of Russ, with the additional advantage that provision was made for distending the urethra with fluid during the passage of the current. This gave all the advantages of dilatation, together with the exposure of a larger surface to the electro-chemical action and increased hyperaemia. A perforated straight silver catheter was used, the top being closed by a small rubber cork through which a hollow silver stylet passed, reaching down to the bottom of the catheter. A small side tube also entered the catheter, so that fluids could be run in, whilst a small ring of rubber tubing round the stem, six inches from the tip, served to make a water-tight joint when the instrument was in position. A glass container and four feet of india-rubber tubing held the chemical solution, which could be run in through the side tube and out again at the top of the hollow stylet. Thus, by closing the exit from the hollow stylet, fluid could be run into the catheter under pressure, dilating the urethra and giving the advantages mentioned. The pressure was regulated by raising or lowering the glass container. Sodium iodide with dissolved iodine (3.4th per cent.) was used, the positive pole being connected up to the stylet within the catheter and a current of 3 milli-amperes passed for ten minutes and then reversed for a similar period.

Of twenty acute cases so treated one only, a mild case, was cured. In this instance twelve applications were given and no other treatment. In the remainder the discharge soon diminished, but the urine did not become entirely clear, and after three weeks' treatment vaccines were used. One of the twenty, a severe case, was practically unaffected after twelve applications. In others various solutions and current strengths were adopted, but with no more definite results. Undoubtedly this treatment has a beneficial influence on the urethritis in the acute stage, the discharge and soreness diminishing, but in my own cases there was nothing to show that it could be considered curative.

THE American Red Cross has sent a group of specialists in infant welfare to France. At its head is Dr. William P. Lucas, Professor of Paediatrics in the University of California. The mission will study the work already being done by the French, and will practise without fees. Its work is to co-operate with French specialists and carry on an educational campaign among French mothers with the object of securing better prenatal hygiene and scientific feeding and care of babies. Special efforts will be made to protect children from tuberculous infection.