SOME ASPECTS OF THE PREVENTION AND TREATMENT OF VENEREAL DISEASES IN THE ARMY, WITH SPECIAL REFERENCE TO GONORRHOEA.

BY LIEUTENANT-COLONEL C. CRAWFORD-JONES,
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VENEREAL diseases in the British Army are treated in hospital, at any rate during their infectious stages; while in many other armies, and in most civilian populations, they are treated as out-patients, except when some immobilizing complication supervenes, such as severe bubo, gonorrhoeal rheumatism, etc. The policy of our Army authorities is to hospitalize patients suffering from venereal disease. Every genital sore arising from sexual intercourse is regarded as a potential syphilitic infection whether clinically resembling syphilis or not.

The case is admitted to hospital and the sore cleansed with normal saline and scraped to obtain a specimen for dark ground examination. If the result is negative the sore is treated with saline and the dark ground examination is repeated on three successive days. And further, if these examinations are negative, a suitable gland in the inguinal group in the groin is chosen and punctured, and five minims of sterile normal saline are injected into the enlarged gland. By movements of the needle the gland tissues are broken down and a small quantity of the fluid is withdrawn and examined under the dark ground for Spirocheta pallida.

If all these procedures are negative, and suspicious clinical signs are present, the blood-serum of the patient is subjected to the Wassermann test at intervals of one week for four weeks, and later once a month for three months.

In this way very few cases of infection with syphilis escape detection and early treatment.

If the sore is frankly of the character of a soft sore, ragged, with undermined edges, painful and bleeding easily, it has been my practice for many years to cauterize it with campheno!. Camphenol is an oily liquid obtained by rubbing up equal parts of camphor and carbolic acid crystals in a mortar.

This procedure has a very definite effect in minimizing the incidence of inguinal bubo which used frequently to accompany this type of sore. A few days dressing with normal saline does not interfere with the subsequent dark ground examinations which will reveal the presence of S. pallida in cases of double infection. By this means many hospital patient days are saved during the course of a year.

1 Extracts from a paper read before the Royal Society of Medicine (United Services Section).
Prevention and Treatment of Venereal Diseases

The patient is kept in hospital until the sore is completely healed or, in the case of syphilis, until all clinical lesions are healed or until the patient has had at least three injections of arsenic and three injections of bismuth treatment, whichever occur last; he then continues the treatment as an out-patient.

Gonorrhoea cases are kept in hospital until they have been dry for at least one week, during which time they are subjected to the passage of a straight sound and a prostate massage. If they remain dry after this stimulation, and no organisms are present, they are discharged. But they are not lost sight of at this stage; follow-up treatment is continued in the shape of observation and prostatic massage once a week for a period averaging two months after leaving hospital.

Prevention.

We all know that syphilis is a waning disease, at any rate so far as the Army is concerned. We know that since the introduction of preventive-treatment packets syphilis has diminished enormously in severity and actual numbers, but in spite of various improvements in the type of preventive outfit, such as the inclusion of 0.1 per cent oxycyanide of mercury incorporated in the calomel cream, the incidence of gonorrhoea has not diminished pari passu with that of syphilis.

The reason appears to be that of those cases of gonorrhoea which give a history of having used this preventive treatment outfit, over 95 per cent state that the outfit was applied at varying times after coitus, the vast majority having used the outfit on return to barracks.

It is very rare to find a case of gonorrhoea who states that he has used his preventive treatment outfit before coitus.

The directions how to use the preventive treatment outfits state that the patient is to urinate in gushes, rub half the contents of the tube well into the glans penis, etc., and inject the other half into the urethra and massage it well down.

When we consider that the gonococcus very soon dissolves the cement between the columnar cells of the mucous membrane lining the urethra, and comes to lie beneath in the substance of the mucous lining, and how very numerous are the thousand and one minute receptacles the gonococcus can and does occupy, namely, the Crypts of Morgagni and Glands of Littré, it would appear that this present method of preventive treatment savours of having locked the stable door long after the horse has been stolen.

During coitus the vaginal fluid enters the urethra, carrying with it gonococci or the infection of syphilis. It is easy to understand how the gonococcus gains a foothold, and once beneath the mucous membrane, no amount of irrigation and applications on the surface of the urethra will eradicate it for a long time.

It is thought that the reason why we do not commonly find urethral chancre is because syphilis requires inoculation through some abrasion or
injury, however small, to obtain a foothold, and that the urethral secretion is inhibitory to the *S. pallida*, which is a very delicate organism.

To reduce the incidence of gonorrhoea the only safe preventive is the unbroken condom (which is nearly but not quite foolproof), care being taken not to infect the parts on its removal.

If the condom is not employed the preventive outfit should be used *prior* to the act.

**TREATMENT OF SYPHILIS.**

Workers in syphilology have many different methods of giving the various antisyphilitic drugs in common use. For instance, some workers think the only method is very intensive arsenical treatment alone, followed at a later date by a course of bismuth in some form; others give both arsenical and bismuth treatment at the same time.

**STANDARD ANTISYPHILITIC COURSE OF TREATMENT WEIGHT 140LBS.**

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<th>DAY</th>
<th>QUANTITY</th>
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<th>INTRAMINE</th>
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<td>85-98</td>
<td>14 DAYS TREATMENT POTASSIUMIODIDE</td>
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<td>REPEAT COURSE 1-27 DAYS</td>
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<td>BLOOD TEST C.S.FLUID</td>
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<td>8 WEEKS REST</td>
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<td>14 DAYS POT. 10G.</td>
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<td>220</td>
<td>574</td>
<td>REPEAT COURSE A.</td>
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**COURSE A.**

**COURSE B.**

**FIG. 1.**

Having reviewed a great number of venereal case cards from the Royal Navy, Army and Air Force, there seems to be great divergence of opinion as to whether the arsenical treatment should be given by the intravenous, intramuscular, or the deep subcutaneous route. Personally, I favour the intravenous route, giving the bismuth concurrently.

In order to standardize the treatment in the Army and give medical officers a lead as to a sound course of anti-syphilitic treatment that had been tried out over thousands of cases with great success, as judged by the infrequency of fatalities, the ultimate percentage of negative Wassermann reactions, and absence of recurrences, a table of standard treatment for the average case of a man weighing 140 pounds was prepared and published by the War Office in 1928, under the special direction of the Director-General at the time, Lieutenant-General Sir Matthew H. G. Fell.

Fig. 1 shows the main principles of this course.
Early primary cases of syphilis who have *S. pallida* present and in whom Wassermann and Kahn reactions are negative at the time of the first injection and remain negative are treated with Course A. Late primary and secondary cases are treated with Course B.

Of course special cases require separate consideration.

It will be noted that in Course A there are two series of injections, each consisting of 3.75 grammes of the 914 product, whereas in Course B there are four series of treatment spread over 374 days. I have included a drug called intramine on the twenty-second and forty-third days of each course. The principle involved is briefly as follows:

When any complex colloidal substance such as the di-oxy-di-amino-ar seno-benzol group is repeatedly injected into any animal, that animal will develop an antibody to the foreign substance. Fig. 2 shows a diagrammatic representation of the molecule of the basis of all the commoner drugs used in the arsenical treatment of syphilis. This molecule is inert, except for the amino groups or the hydroxyl groups, and the arsenic in these compounds is trivalent.

The antibody to the 914 preparation seizes upon the available amino or hydroxyl groups, and renders the molecule of 914 inert. When this inert foreign substance is circulating in the body, the liver and possibly the spleen, with their selective action, remove the substance from the circulation and proceed to break down the foreign molecule with the liberation of the contained arsenic, which is rapidly converted from a trivalent to a pentavalent form. The pentavalent forms of arsenic are sometimes more toxic than the trivalent. Hence, with repeated doses, an appreciable quantity of the arsenical drug injected is appropriated by the antibody, and thus it is not free to attack the spirochete, and further, after disintegration in the liver, it is very apt to cause toxic arsenical jaundice, arsenical dermatitis and the like.

If the chemical constitution of the molecule of intramine is examined (fig. 3), it is found to be very similar to that of the common arsenical drugs, having the same amino- and hydroxyl group present, but sulphur as the connecting link between the two benzine rings instead of arsenic.

The antibody developed by the repeated 914 injections coming in contact with the intramine molecule seizes upon it and fixes its molecule in a
similar manner as in the case of the 914 molecule. This is sorted out by the liver, etc., and broken up, with the liberation of sulphur, which, being a reducing agent, will counteract the oxidizing properties of any absorbed toxic arsenic; and further, will continue with the antibody, leaving the 914 molecule free to attack the spirochæte, or to be eliminated.

Whether this explanation is true or not, the fact remains that in my own practice for the past eighteen years I have had remarkably few cases of intolerance of arsenical drugs; whereas before I included intramine in the standard course, jaundice, and even arsenical dermatitis of the exfoliative type were moderately common.

Should arsenical intolerance supervene during the course of treatment, the curative effect of sodium thiosulphate is well known. In cases treated with the sulfo compounds, it has been noted that the ordinary arsenical jaundice, urticarial and other rashes may occur, and, what is more serious, purpura hæmorrhagica may develop in varying degrees of intensity, and to counteract this a calcium thiosulphate preparation, such as calciostab, has been found to be most efficacious. 0·6 gramme is given intravenously, and can be repeated every twelve or twenty-four hours, as necessary. It should be given very slowly.

The patient experiences a sensation of heat or fire running throughout his veins, but beyond this no untoward symptom has been noted, and he is rapidly placed on the highway to recovery. It is considered that calcium thiosulphate is a very definite advance in our armamentarium against the toxic effects of arsenical drugs given in the treatment of syphilis.

**TREATMENT OF GONORRHOEA.**

There are two main methods of attacking gonorrhœa: (a) Local treatment; (b) general treatment.

(a) **Local Treatment.**—From the very pathology of the disease and the burrowing habits of the gonococcus, it is obvious that this method has very sharply defined limitations. It is considered that far too much attention has been paid to this side of treatment in the past.

Whether strong or weak antiseptics are used for irrigating fluid, or an individual inflamed gland of Littré is treated with caustic or other means, there are several hundred glands similarly infected, but not blocked and obviously infected. For the cure of gonorrhœa drainage is essential. But early instrumentations and irritating irrigating fluids can only be damaging to a delicate mucous membrane which will not support manipulation at any time without injury, still less when the cells lining the urethra are poisoned and devitalized by the gonococcus toxin.

So it appears that the logical attack on gonorrhœa must really be concentrated on the second method, namely general treatment. By this is meant attacking the gonococcus from within the body of the patient by aiding the natural force of antibodies, bringing the hydrogen-ion concentration
of the urine to the optimum value. For instance pH 7.2 is the optimum value in the case of the gonococcus which is most vulnerable at that value, but the majority of secondary organisms are most easily attacked at a lower value, 6.8 to 7.0.

Diet, exercise, mental contentedness, and general well-being all play their part in placing the body of the patient in the best condition to defend itself against gonorrhoea and its attendant complications.

**Vaccine Treatment of Gonorrhoea.**

Some years ago Major E. C. Lambkin, D.S.O., R.A.M.C., and Major Lyn Dimond, R.A.M.C., introduced an exotoxin. It was found that certain strains of gonococci grown on specially enriched media at a controlled hydrogen-ion concentration value developed Neisser positive bodies similar to the Babes’ bodies produced by the diphtheria bacillus.

These bodies are loosely attached to the gonococci, and by a process of washing in saline and a high speed fractional centrifugalization a layer of them can be separated.

This product was found to be definitely antigenic, and was put up in vaccine form and administered intradermally with good results, but these were not so satisfactory as it was felt they ought to be.

Major G. F. Carr, M.C., R.A.M.C., working on the clinical side, and Major E. G. Anthonisz, R.A.M.C.(R.P.), working in the special research laboratory at the Royal Herbert Hospital, began investigations into the cause of the apparent failure of this special exotoxin vaccine.

It was very soon noted that in the microscopical slides prepared from cases of gonorrhoea many other organisms were present besides gonococci. These secondary organisms had long been known, and not very much attention had been paid to them.

Much work was done in isolating the various secondary organisms found complicating gonorrhoea.

The organisms isolated fall into the following groups:

(a) Gonococci. Numerous strains.

(b) Staphylococci. Mostly *albus*, but some *aureus* strains.

(c) Streptococci. The streptococci all conform to the same morphological and cultural characteristics, and apparently belong to the group "enterococcus." In urethral smears they almost invariably appear as Gram-positive diplococci; only very occasionally can short chains be seen. On solid media growth is copious and semi-transparent, contrasting with the denser and whiter growth of staphylococci. Stained preparations from cultures on the solid media are often indistinguishable from staphylococci, but may show a tendency to start chain formation. However, on subculture in a fluid medium, such as Hiss' serum medium, there is no doubt about the chain formation and the other characteristics of streptococci of the enterococcus group. Cases showing this type of secondary
organism with secondary infection almost invariably turned out to be very intractable, sometimes developing joint complications. An autogenous vaccine is very successful in these cases.

(d) Diphtheroids. In this group many different types of Gram-positive organisms have been found complicating gonorrhoea—cocco-bacilli, short thick bacilli, short thin bacilli which often are very weakly Gram-positive, and various longer types.

In the smear from the patient, the cocco-bacillus type appears to be the most prevalent; it is difficult to distinguish from the staphylococcus and the enterococcus type of streptococci.

*Bacillus coli* has only rarely been found.

It is interesting to note that in the very first and subsequent smears taken on admission, 70 per cent of fresh cases of gonorrhoea show the presence of secondary organisms.

Undoubtedly the best method of dealing with these cases of gonorrhoea is an autogenous vaccine in which the particular strain of gonococcus and the various secondary organisms isolated are represented.

Hence it is the aim of the Research Department of the Royal Herbert Hospital, Woolwich, to prepare a polyvalent vaccine which contains representatives of all the strains of gonococci likely to be met with infecting British troops in any part of the world, including different strains of the commoner secondary organisms.

The vaccine we are working on at the present time contains 26 strains of gonococci, 40 strains of staphylococci, 38 strains of enterococcal streptococci, and 60 strains of various types of diphtheroids; all isolated from cases of gonorrhoea.

The strength in which the vaccine is put up per cubic centimetre is as follows: Gonococci, 50 million; staphylococci, 500 million; streptococci, 500 million; diphtheroids, 500 million.

Hand in hand with the laboratory investigation, the clinical effect of vaccines, dose, interval between doses, of diet, exercise, and drugs to bring up the hydrogen-ion concentration of the urine, are all being investigated with a view to finding out the optimum procedure to be adopted in cases of this elusive and aggravating disease.

The results obtained so far are very definitely encouraging, especially from the point of view of effecting a real cure of the disease. But from the point of view of the administrators and the Treasury the real difficulty is to reduce the hospital patient days. Naturally, during the experimental phases, we cannot expect great results in this respect.

I should like to thank Colonel F. C. Sampson, D.S.O., late Officer Commanding the Royal Herbert Hospital, Woolwich, for his permission to publish a résumé of some of the work going on in the hospital when under his command. Also my colleagues, Major G. F. Carr, M.C., R.A.M.C., and Major E. G. Anthonisz, R.A.M.C. (R.P.), for their valuable assistance.
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*J R Army Med Corps* 1937 68: 175-181
doi: 10.1136/jramc-68-03-05

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