us the victory, but which to the young obstetrician will appear but meaningless ritual. Then there will be a tendency, which it will be hard to resist, to relax some of the precautions, but so long as *Str. pyogenes* continues to exist in the throats of the people such relaxation will inevitably be followed by the reappearance of puerperal sepsis, the history of which is reflected in the history of the Rotunda Hospital.

PENICILLIN AND THE TREATMENT OF INFECTED HANDS IN OUT-PATIENTS

BY

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Penicillin is widely used in the treatment of the infected hand. It has been employed as a cream or powder for local application, and by direct injection into the theca in cases of suppurative tenosynovitis. In this review of cases treated at the Westminster Hospital it is our aim to assess the value of a method of administering systemic penicillin which can be used on out-patients. Only two of the patients treated with penicillin were admitted to hospital. This was from necessity rather than choice in the first instance, but later, when supplies of penicillin became available, out-patient treatment was deliberately adopted to save blocking hard-pressed bed space.

Eighty-five per cent. of all cases reviewed, and all cases receiving penicillin, were seen and treated by us throughout. In the remainder incision was done by casualty officers, but after-treatment was prescribed by us. This ensured uniformity for the purpose of assessment. The cases are considered under two groups: Group I consisted of 168 cases treated without systemic penicillin, and Group II of 17 cases treated with systemic penicillin. Within each group the following types of lesion are differentiated: (1) paronychia and pulp-space infections; (2) tenosynovitis; (3) palmar-space infections.

It is not feasible to give penicillin at four-hourly intervals to out-patients, and it was therefore hoped that a therapeutically adequate serum level might be maintained by two large doses, given morning and evening by intra-muscular injections of aqueous solutions or beeswax-oil suspensions. The aqueous solutions produce high serum penicillin levels of brief duration, whereas the wax-oil suspensions produce a lower but more prolonged serum level and were found clinically to be more efficacious. No untoward effects, such as urticarial reactions or marked pain, were noted.

Diagnosis

(1) Pulp-space infections and paronychia were usually only too obvious, as the average duration of symptoms before the patient arrived at the surgery was six days.

(2) Tenosynovitis was diagnosed by the following criteria: swelling of the whole finger, which was held in a semi-flexed position; great tenderness on pressure over the tendon sheath; and severe pain on attempted passive extension.

(3) Palmar-space infection (middle and thenar spaces) was diagnosed by diffuse tenderness, convexity of the palm overlying the affected space, and gross dorsal oedema.

Treatment

Palmar-space infections were drained by incising into the web, passing a Spencer Wells forceps into the space, and inserting a corrugated rubber drain deep into the space, to be left in place for three days. In the tenosynovitis cases incision of the tendon sheath was not needed. When the inflammation was secondary to superficial infection the latter was drained by through-and-through incisions, with administration of systemic penicillin in Group II cases. When secondary to puncture wounds, penicillin only was used, without incision. Pulp-space infections were treated by bilateral incision with through-and-through drainage. In most cases of paronychia the entire nail was removed, as attempts to save part of it resulted in slower healing with a distorted nail and nail-bed.

The dressing applied at operation was changed after three days, when any drain was removed; the wound was then dressed with 17½% sodium sulphate and left for four days. Subsequent dressings, if required, were done at intervals of a further five to seven days. Soaking in hydrogen peroxide to facilitate removal of hardened dressings was reduced to a minimum. Some wounds were dressed with gentian violet, soda sulphate and acriflavine, "tulle gras," or penicillin cream, but the impression was that the medication made little difference to the rate of healing. All septic hands were kept in a sling at least until the first dressing was done. Adequate analgesics were given on the first two to three days after incision, but, if incision had been adequate, little was needed after twenty-four hours. Most noticeable was the great relief of local pain on starting systemic penicillin. Patients were instructed to keep the dressings dry and undisturbed. This ideal could not be attained by all of them—for example, mothers of young children. Such patients were instructed to remove the wet sodden dressing and replace it with a clean piece of dry lint or gauze with no ointment of any kind. Otherwise all dressings were done separately from the rest of the surgery cases, with sterile dressings by a "clean" nurse. No patients were discharged until they were able to do full work with either no dressings at all or a dressing of such size that it would not interfere with their manual skill or render them liable to accident due to clumsiness because of the bandage—an important consideration, as many of these patients were skilled workers.

Results

An analysis of the 168 cases treated without penicillin is given in Table I. The period of unfitness for work is

TABLE I.—Details of 168 Cases Treated Without Penicillin (Group I)

Lesion	No. of Cases	Av. Duration of Symptoms before First Attendance (Days)	Day of Incision after Treatment Started				Average Time Unfit for Work (Days)
			Same Day	1st	2nd	3rd	
Paronychia and pulp-space infections ..	135	6.1	91 (67.4%)	23 (17%)	10 (7.4%)	11 (8.2%)	21.0
Tenosynovitis	16	5.5	9 (56%)	5 (31%)	2 (13%)	—	17.5
Palmar-space infections	17	4.6	9 (53%)	4 (24%)	3 (17%)	1 (6%)	16.5

Average days unfit for work, 20.3.

calculated from the first hospital attendance till discharge. The shorter convalescence of the tenosynovitis and the palmar-space infection cases is explained by the fact that, though the lesions were more serious, it was possible to send a man back to work with a strip of "elastoplast" over his finger or palm when it would have been impossible with a dressing on his finger tip.

In the 17 cases in Group II two forms of penicillin were used—the ordinary water-soluble penicillin and a suspension of penicillin in beeswax and oil. Patients in bed were given intramuscular injections of 30,000 units of the former four-hourly. Out-patients were given massive doses, up to 300,000 units, of water-soluble penicillin morning and evening, or 100,000 to 150,000 units in beeswax and oil at similar intervals. Details are set out in Table II. These cases

TABLE II.—Details of 17 Cases Treated With Penicillin (Group II)

Case No.	Lesion	Days of Symptoms before First Attendance	Day of Incision after Treatment Started	Days Unfit for Duty	Treatment with Penicillin (Units)
1	Pulp infection of paronychia	5	Same day	10	7 × 300,000 W.S.
2	"	5	"	8	6 × 125,000 B.O.
3	"	6	"	7	8 × 150,000 B.O.
4	"	4	1st	4	4 × 300,000 W.S.
5	"	4	Same day	9	4 × 300,000 W.S.
6	"	4	"	8	300,000 W.S.; 3 × 150,000 B.O.
7	"	6	"	12	6 × 150,000 B.O.
8	Tenosynovitis	2	Not incised	3	1 × 500,000 B.O.
9	"	3	"	8	6 × 125,000 B.O.
10	"	3	Same day	10	8 × 300,000 W.S.
11	"	5	"	8	4 × 300,000 W.S.
12	"	14	Not incised	8	4 × 100,000 B.O.
13	"	14	Same day	22	4 × 300,000 W.S. (b.d.) (bed 5 days)
14	Palmar-space infection	4	1st	12	6 × 200,000 W.S.
15	"	2	Not incised	8	4 × 125,000 B.O.
16	"	3	2nd	41	860,000 (30,000 4-hourly) (bed 5 days)
17	"	5	Same day	8	4 × 150,000 B.O.

W.S. = water-soluble penicillin. B.O. = penicillin in beeswax and oil.

received treatment with penicillin because they were clinically more serious than those in Table I. In spite of this the duration of treatment was considerably shorter.

The three cases below are described, as they represent the two extremes in the duration of incapacity. Case 8 was able to return to duty only two days after receiving an unintentionally large dose of penicillin, while the other two patients were away from their work for 22 and 41 days respectively.

Case 8.—This was a nurse who two days previously had run a needle through her left index finger. When seen she had every sign of a severe suppurative tenosynovitis of the finger. By an error she received a dose of 500,000 units in beeswax at one injection—five times greater than intended. Twenty-four hours later every sign and symptom had completely disappeared, and two days later she returned to full duty.

Case 13.—This was the worst case of tenosynovitis seen in nine months. The patient was a soldier who had complained of symptoms suggestive of a pulp-space infection for a fortnight but had nevertheless been on full duty, including work as a porter at Billingsgate during a strike. He had been carrying crates of fish the night before he was sent to hospital with all the signs of suppurative tenosynovitis. He was ambulant and fit for discharge to light duty after five days in bed, but it was thought wiser to keep him in "protective custody" for a further seventeen days.

Case 16.—This patient had a severe palmar-space infection which was almost healed on discharge from hospital to the out-patients' department after five days. Contrary to advice, while still under treatment he returned to his work as a cook and dishwasher with the result that his wound became sodden and re-infected and his convalescence was prolonged to 41 days.

If Cases 13 and 16 are excluded the remaining fifteen cases give an average duration of days unfit for work as follows:

Type of Lesion	No. of Cases	Average Loss (Days)
Paronychia	7	9.9
Tenosynovitis	5	7.4
Palmar-space infection	3	9.3
Total	15	8.9

Notes concerning Serum Penicillin Levels obtainable with Wax-Oil Suspensions

Serial serum penicillin levels were estimated in one case (No. 13) following a single intramuscular injection of 150,000 units of penicillin in beeswax and oil; these are shown in the Chart. Estimations made at random on other cases conformed with this curve. In one case in which an estimation was made twelve hours after a single injection of 150,000 units the neat serum was found to have no inhibitory power. In a further case (No. 8) a single intramuscular dose of 500,000 units was given: no inhibition was detectable nineteen hours after injection.

Chart showing serum penicillin levels following a single intramuscular dose of 150,000 units of penicillin in beeswax and oil.

It is clear from these few observations that a practically continuous level of penicillin, averaging only 0.08 unit per ml., can be maintained throughout the twenty-four hours by giving late evening and early morning doses of 150,000 units of penicillin in wax-oil suspension. It is to be noted, however, that the peak level obtainable with such a scheme is only 0.32 unit per ml. From the gratifying results achieved in the series of cases here reported it would appear that the need for higher peak levels has not arisen. But it is most necessary to remember that organisms only slightly more resistant than the Oxford staphylococcus would be quite unaffected by the levels obtained with this mode of treatment. Moreover, such levels do not provide a sufficient "head" for the penetration of necrotic tissue. For these reasons the use of wax-oil preparations should be abandoned if no response is apparent at the end of forty-eight hours. It should be noted that, clinically, nearly as good results were obtained with 300,000 units of penicillin in watery solution twice a day. Serum penicillin estimations were not made on cases so treated.

Commentary

Since the disability from a septic finger treated without penicillin lasts nearly as long as that ensuing in the average case of appendicitis any form of treatment that will appreciably reduce this time is justified. In the above series the period of disability has been reduced by 56%—from 20.3 days to 8.9 days. Though this series be small, it justifies in our opinion the use of penicillin in all severe or potentially severe cases of septic hands and in all cases needing incision. The dosage will vary with the clinical picture, but the minimum dosage should be 125,000 units of penicillin in oil or 300,000 units of water-soluble penicillin morning and evening for at least forty-eight hours. At the time these observations were begun it was impossible to carry out this as a routine owing to the shortage of penicillin in oil and the expense of massive doses of water-soluble penicillin.

As it is possible to treat these cases in the out-patients department there is a considerable saving in bed space as

well as in man-hours. Even better results would be obtainable if patients could be seen in the earlier stages of infection. Of the cases detailed in Table I, 65% needed immediate incision; in the three cases in Table II in which penicillin treatment was started less than three days after the onset of symptoms incision was unnecessary. This once again emphasizes the need for early diagnosis of the various infections of the hands and for appreciation of their serious nature.

Summary

A review is presented of 185 cases of infected hands seen in the surgery of Westminster Hospital—168 treated without, and 17 with, penicillin.

Cases treated without penicillin included 135 of paronychia and pulp-space infection, with an average loss of 21 days' duty; 16 cases of tenosynovitis, with an average loss of 17.5 days; and 17 cases of palmar-space infections, with an average loss of 16.5 days. The average loss of duty for these 168 cases was 20.3 days.

The penicillin-treated series comprised 7 cases of paronychia and pulp-space infection, with an average loss of 9.9 days' duty; 6 cases of tenosynovitis, with an average loss of 9.9 days (excluding Case 13, 7.4 days); and 4 cases of palmar-space infection, with an average loss of 17 days (excluding Case 16, 9.3 days). The average loss of duty in these 17 cases was 10.9 days. If the two unusual cases, Nos. 13 and 16, are excluded, the final average is reduced to 8.9 days—a saving of 56% compared with the non-penicillin series.

On the basis of these results it is suggested that the administration of penicillin in all severe infections of the hand, both in the early stages and after any necessary surgical intervention, should be adopted as a routine method of treatment.

In practice a dosage of 125,000 units in oil or 300,000 units in aqueous solution twice daily has been found adequate.

We are indebted to Mr. G. T. Mullally, Senior Surgeon, Westminster Hospital, whose enthusiasm and interest made this experiment possible; to Prof. R. J. V. Pulvertaft, who made penicillin in beeswax-oil available at a time when supplies were limited; and to the nursing staff of the surgery for their co-operation in carrying out treatment.

One of us (C. M. F.) is grateful to the Medical Director-General, Royal Navy, for permission to publish.

The President of the Medical Defence Union, Mr. St. J. D. Buxton, speaking at the Annual Meeting on Sept. 16, said that during the preparation by the General Medical Council of a Bill to amend the Medical Acts, representatives of the Medical Defence Union (together with those of the sister societies) had been received by the President of the G.M.C. and a subcommittee. Many of the recommendations made by the Union had been well received, but there was not agreement on all matters. In view of a clause in the Bill allowing appeal to a court from a decision by the G.M.C., the position of any member who had been defended by the Union was somewhat anomalous. In order that he should remain a member during the time allowed for decision as to whether an appeal should be lodged and during the hearing of such an appeal, the Articles of Association would be amended. Speaking of the National Health Service Act, he said that legal representation would be permitted on specified occasions, when practitioners were summoned regarding professional procedure and conduct. The Council periodically had to consider whether the Union could defend members against whom proceedings were being taken by patients in a matter not directly one of professional principle. Although the Council might wish to assist the member, the Union's Memorandum would not permit of the risk being covered by the Union. Hence it was recommended that members should take out a policy with a reputable insurance company to cover injury to patients, not connected with professional affairs, when on the practitioner's premises. Those who read the medico-legal matters in the medical and lay press would be aware of the importance of an action concerning assistants' agreements. He advised any members employing or seeking to employ an assistant, and all assistants who were members of the Union, to seek the Union's advice regarding the wording of the agreement, as the Council had obtained leading counsel's opinion and the Secretary was in a position to submit a suitable clause. With regard to swabs, it was noticeable that the retention of swabs in the pharynx after nose and throat operations had recently been more frequent than in the abdomen.

RELATION OF ABACTERIAL PYURIA TO REITER'S SYNDROME

BY

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Abacterial pyuria has been discussed in several recent papers. Its general features are now well recognized, but its aetiology remains obscure. Probably the most commonly held theory is that it is due to a virus infection.

That Reiter's syndrome might be associated with a sterile cystitis has been known from the first. Later, Colby (1944) described three cases with renal symptoms. His second case is of particular interest, since it demonstrates the development and final resolution of a hydronephrosis. This has often been noticed as a renal complication in abacterial pyuria. In addition one kidney was removed because it was thought to be tuberculous. Section of this kidney showed a thin parenchyma with a dilated pelvis and calices and numerous scattered haemorrhages, but no evidence of tuberculosis. Unfortunately a report of the microscopical appearance is not given, but so far as it goes the condition seems to be similar to that described by Donovan (Moore, 1943) in a similar case later proved to be abacterial pyuria. Cystoscopy in Colby's case showed a diffuse reddening of the bladder. No specific treatment was given and the condition cleared up, but there was a relapse four years later. Prostatitis was present in two of Colby's cases, and an abscess formed and discharged in one. Hollander *et al.* (1945) noted a residual prostatitis in four of his cases.

Joint effusions have been reported in several cases of abacterial pyuria lately. If the cases reported below had come under observation at a time when the urethritis and cystitis were present but before the arthritis developed they would undoubtedly have been classified as abacterial pyuria, not as Reiter's syndrome. It would appear that there is nothing to distinguish the sterile urethritis, cystitis, prostatitis, and pyelitis found in Reiter's syndrome from abacterial pyuria. It has repeatedly been stressed that all cases of abacterial pyuria respond to N.A.B. (Baines, 1947; Moore, 1943; Vassallo, 1946). I have found the same response, so far as the urinary symptoms are concerned, in those cases of Reiter's syndrome that I have treated with N.A.B. The joint lesions did not appear to be greatly affected, though they all cleared up more quickly than might have been expected, and no new lesions were seen after the completion of the N.A.B. treatment. No relapses have been seen up to the time they were lost sight of (six to nine months). In so variable a disease this observation is not of much value. It should be noted that Reiter found arsenic, in the preparation used by him, ineffective, as also have some other workers. The failure of the joints to respond was not unexpected, and finds a parallel in the effect of arsenic on the genital tract lesions of abacterial pyuria.

I have suggested elsewhere (Baines, 1947) that abacterial pyuria is a coital, if not a venereal, disease. Vassallo (1946) came to the same conclusion. He assumed that the urethritis and cystitis were parts of an ascending infection. I have gone further and suggested that the whole urinary and genital tract may be infected by an organism gaining entrance through the urethra. It seems possible that the other symptoms seen in Reiter's syndrome may be a further extension of the same process. In the investigation into abacterial pyuria mentioned above it was thought that there was a characteristic cystoscopic picture in this condition. Two of the cases reported below underwent cystoscopic