work is needed before the value of pyrimethamine in the treatment of malaria can be assessed. Our own results indicate that it is unsuitable for the treatment of acute malaria caused by Malayan strains of *P. falciparum*; its effect on parasitaemia is so uncertain that it could not be relied upon in a heavy infection.

Drug-resistance.—In recent years, and particularly since the advent of proguanil, the problem of drug-resistance in malaria parasites has assumed a new importance. Not only must the ability of parasites to develop resistance against a drug be investigated, but also the possibility of cross-resistance between different drugs. Schmidt (1953) found that *P. cynomolgi* in monkeys could quickly be made resistant to pyrimethamine, that the resistant quality was transmissible through the mosquito, and that resistant trophozoites were also refractory to treatment with proguanil. Rollo (1952) produced resistance to pyrimethamine in *P. gallinaceum* and *P. berghei*, but found that the drug was almost as active against proguanil-resistant strains in the laboratory as against normal strains. We are still uncertain whether falciparum infections which fail to respond to pyrimethamine are also resistant to proguanil; but the figures in Table II suggest that proguanil-resistant strains of *P. falciparum* behave similarly to unselected Malayan strains of falciparum when treated with pyrimethamine.

Summary

Pyrimethamine, a new antimalarial drug of the 2:4-diaminopyrimidine series, has been used in Malaya for the treatment of 126 patients with acute malaria.

Eighty patients had previously untreated acute falciparum malaria. A single dose of 50 mg. of pyrimethamine failed to cure 2 out of 15 patients; a dose of 100 mg. (in two doses of 50 mg. each) failed to cure 4 out of 39; and a total dose of 300 mg. (100 mg. on the first day and 50 mg. daily for the next four days) failed to cure 7 out of 26 patients. Apart from the failures, the action on fever and symptoms was usually slow.

Twenty-four patients whose falciparum infections had proved refractory to treatment with proguanil were given 100 mg. of pyrimethamine. Results were so similar to those described above as to suggest that resistance to proguanil does not affect the response to pyrimethamine, and is therefore unlikely to have been responsible for the failures in the other groups.

Workers in other countries have obtained better results than these, but occasional failures have been encountered, as has also the slow action on fever and symptoms. Whatever the verdict elsewhere, pyrimethamine must be regarded as unsuitable for the treatment of acute malaria due to Malayan strains of *P. falciparum*.

Eleven patients with acute vivax malaria were treated with the 50-mg. single dose, and eleven with the 100-mg. dose. Disappearance of parasites was slow, but there were no failures.

We are greatly indebted to Brigadier J. S. K. Boyd, Director of the Wellcome Laboratories of Tropical Medicine, for the supply of pyrimethamine and for information about its properties.

REFERENCES

- Archibald, H. M. (1951). *British Medical Journal*, 2, 821.
 Falco, E. A., Goodwin, L. G., Hitchings, G. H., Rollo, I. M., and Russell, P. B. (1951). *Brit. J. Pharmacol.*, 6, 185.
 Goodwin, L. G. (1952). *Trans. roy. Soc. trop. Med. Hyg.*, 46, 485.
 McGregor, I. A., and Smith, D. A. (1952). *British Medical Journal*, 1, 730.
 Rollo, I. M. (1951). *Nature, Lond.*, 168, 332.
 — (1952). *Trans. roy. Soc. trop. Med. Hyg.*, 46, 474.
 Schmidt, L. H. (1953). *J. Pharmacol.* In press.
 Schneider, J., Canet, J., and Dupoux, R. (1952). *Bull. Soc. Path. exot.*, 45, 33.

USE OF LOCAL ANALGESIA IN SEPTIC-FINGER SURGERY AT A TEACHING HOSPITAL

BY

P. E. B. HOLMES, M.B., B.S., B.Sc.
 Senior Casualty Officer, King's College Hospital

AND

D. J. C. GRAFF, M.R.C.S., L.R.C.P.
 Late Second Casualty Officer, King's College Hospital

The purpose of this limited survey is to ascertain whether local analgesia is an advantage over general anaesthesia in septic-finger surgery. The operations have been performed by the casualty officers and the casualty dressers; although the latter change once a week, they have operated on two-thirds of the cases. Each new dresser has one or two practical demonstrations of the technique of analgesia and the principles of drainage; he is then allowed to operate single-handed, but with a casualty officer present.

The investigation began in February, 1952, and covers 256 patients operated on between that time and July, 1952. In the final analysis the case records are complete enough in only 209. The youngest patient was 3 years old and the eldest 85.

For the most part we have followed the terminology used in Professor Pilcher's clinic at University College Hospital (Pilcher *et al.*, 1948; Bailey, 1952). We have used local analgesia for the fingers and thumb. The types of infection classified are: (1) Acute paronychia (40.2%). (2) Pulp abscess: this includes the terminal pulp only (24.2%). (3) Apical abscess: the "apex" being that space lying between the true pulp and the end of the finger (9.3%). (4) Subcutaneous abscess, both volar and dorsal (17.9%). (5) Subungual abscess: we use this group to include sepsis following on splinters under the nail (8.2%).

Method of Treatment

Most cases were operated on at their first attendance. When pus has not been obvious on examination we have found that throbbing pain and loss of sleep are the symptoms which are most suggestive of its presence.

Analgesic.—2½% procaine solution without adrenaline was used. For the first two months the injections were given at the sides of the proximal phalanx—but later the nerves were injected as they leave the palm, just distal to the deep transverse metacarpal ligament. After cleansing with tincture of cetrimide, the dorsal skin between

FIG. 1.—Sites for injection of the various fingers.

the knuckles is stretched and a very fine needle introduced here (Figs. 1 and 2). It is directed distally and forwards—fairly near to the proximal phalanx. Before withdrawal the needle is directed across the knuckle to block the dorsal nerves and the site for injection of the opposite side of the finger: the second injection is then made. In all, 6 ml. is usually more than enough. At this stage we allow *at least five minutes*, preferably ten minutes, for the block to become effective.

FIG. 2.—A longitudinal section at the level of a metacarpophalangeal joint; for the sake of clarity, the other structures at this level have been omitted.

A tourniquet of thin rubber is placed on the finger at its base. This is essential, since the extent of dead tissue and "collar-stud" sinuses cannot be seen without a bloodless field. We stress to students that (1) incisions must be adequate in extent, placed if possible over dead skin, and in the direction of Langer's lines; (2) all slough must be removed and the cavity mopped out; (3) deep extensions must be carefully sought with a probe; and (4) drainage must be ensured by the use of a small piece of tulle gras (which serves solely to hold the edges of the incision apart) and often by the excision of a narrow diamond of skin.

We have not used "through-and-through," "hockey-stick," or "alligator" incisions for pulp lesions. For paronychia we used the classical lateral incision, as merely elevating the nail-fold has not been found effective. When possible, distal healthy nail has been left *in situ* as protection. For infections at the side of the nail we have removed a strip wide enough to ensure drainage rather than the whole nail.

After operation a dry dressing is applied and the tourniquet removed; the circulation is checked and a tubular bandage applied. This has been found much more useful than the orthodox finger bandage. The affected arm is rested in a sling for at least two days. The patient is given a small supply of codeine tablets.

Dressings.—These are done as infrequently as possible. The patient attends the day after operation, but if, as expected, he has had a good night and the dressing is comfortable it is not touched for 48 hours. Then the wick is removed and suitable dressings are continued. These are performed in a morning hand clinic, where the same casualty officer and nurses deal with the cases daily. There is also a physiotherapist in attendance. For certain cases we have soaked the wound in chloramphenicol solution (2½% in propylene glycol) for five minutes. Otherwise we have kept the wounds dry and have instructed the patients to do likewise.

Chemotherapy and Bacteriology.—In all but nine cases penicillin (300,000 to 600,000 units of procaine penicillin daily) has been given. Five patients received systemic chloramphenicol because of the isolation of penicillin-resistant organisms and a tendency to chronicity. Bacteriological sampling was not undertaken as a routine measure except for a short period during April, May, and June, 1952, when bacteriological swabs were taken from the lesions of all patients at the time of incision. In 100 consecutive cases comprising all types of hand infection, cultures were sterile on two occasions; in the remaining cases the organisms isolated were: *Staphylococcus aureus*, 94 cases (in pure culture, 88 cases); *Streptococcus pyogenes*, 7 cases (in pure culture, 2 cases); coliform bacilli, 4 cases (in pure culture, 2 cases). Infections with two or more organisms were found in six cases. Of the staphylococci 77% were sensitive to penicillin.

Results

The results are expressed in days of disability from the first symptoms until operation and from operation until the end of treatment, and of total disability. The pulp abscess is the most common type of infection to become chronic. We have had 12 such complicated cases in this series; in these, the total disability has been over 14 days. In Table I are shown separate results for the straightforward cases and for the 12 cases with complications. In the last column are shown the results achieved by Bailey.

TABLE I.—Disability Times from Onset Until Operation and from Operation until Discharge

No. of Cases	Type of Infection	Average Disability Time in Days			Total Time U.C.H. Series
		Pre-operative	Post-operative	Total	
85	Paronychia ..	4.7	8.4	13.1	14.3
48	Pulp abscess (total)	5.0	12.5	17.5	18.7
36	Pulp abscess (uncomplicated) ..	4.9	6.9	11.8	
12	Pulp abscess (complicated) ..	7.6	30.9	38.5	
37	Subcutaneous abscess ..	4.3	8.0	12.3	14.5
21	Apical abscess ..	4.9	11.1	16.0	11.0
18	Subungual abscess	4.8	10.1	14.9	

From the point of view of this investigation it is necessary to compare local analgesic with general anaesthetic cases as regards post-operative time. This has been done from the records of this hospital for 1951, when general anaesthetics were used. The cases were selected according to letters A-L of the names record. The unbiased comparison is shown in Table II.

TABLE II.—Comparison Between the 1951 and 1952 Series

	Type of Infection	Post-operative Time in Days	Type of Infection	Post-operative Time in Days
1951 series (G.A.)	Paronychia (80 cases)	11.6	Pulp abscess (50 cases)	15.0 (22 cases >14 days)
1952 series (L.A.)	Paronychia (85 cases)	8.4	Pulp abscess (48 cases)	12.5 (12 cases >14 days)

The results reveal that: (1) The figures for disability time are similar for the large University College Hospital series and this small series; in both, local analgesics were used. (2) The figures at this hospital are better when a local analgesic has been used. We are convinced that the reason for this is unhurried careful operation in a bloodless field. (3) The disability time for "simple" pulp abscesses (three-quarters of the cases) is seen to be about the same as that for paronychia. (4) Failure to obtain a quick recovery has been due to osteitis (three cases); inadequate drainage by doctors outside the hospital (three cases); inadequate drainage at the hospital (four cases); far-advanced initial lesions (four cases); fracture of terminal phalanx (two cases); and lack of co-operation (one case). (5) The difference in disability time between the local and general anaesthetic cases may seem slight; however, for the cases in Table II alone it represents one man's work for 18 months. (6) It would seem from Table I that the average patient, no matter what type his infection, lingers about five days before coming to hospital; this time allows for the formation of pus.

Discussion

As a result of the investigation we are of the opinion that local analgesia is definitely superior to general anaesthesia for infections of the fingers. The reasons are:

From the patient's point of view.—We have found that the majority prefer an injection to a "whiff" of gas, with its attendant period of starvation and the chance of post-anaesthetic debility and vomiting.

From the surgical point of view.—The advantages are many. They are summarized thus: Local analgesia has

been objected to because it is said to endanger the blood supply of the finger. We do not use adrenaline, and if the injection is given as above there is no mechanical constriction except by the tourniquet. We have watched the colour of the finger-tips post-operatively and found it normal in all cases. Another objection is the injection of fluid into potentially infected tissues—making them oedematous and thereby risking spread of infection. We have met neither of these complications, nor sensitivity to procaine. General anaesthesia involves a small risk and, in addition, a wait until the statutory four hours has passed since a meal. Its possible unpleasantness has been mentioned.

Above all, it is preferable to be able to operate with care on a stationary finger rather than to make a quick incision on a patient who is perhaps not too well anaesthetized. This type of operation leads inevitably to inadequate drainage.

The knowledge that operation can be performed immediately under local analgesia is of great value: there is no temptation to defer operating should the patient attend in the evening, nor are superficial pustules opened without anaesthesia and without proper exploration.

Local analgesia can be attained by anyone working alone, and from the point of view of casualty officers in small hospitals it is excellent; in fact, it has been practised in many such hospitals for some years. It is a better method for teaching purposes, since the student learns to work with care and sees the lesion clearly. There is also the extra time which the inexperienced operator needs.

In conclusion, we would stress that students under supervision have performed most of the operations; the results indicate that this is a satisfactory method.

We thank Mr. E. G. Muir for his helpful criticism and permission to publish these cases, also the other casualty officers, Sister Doris, the nursing staff, and the students who have done most of the operating. We also acknowledge the help we have received from the Bacteriology Department, and in particular thank Mr. K. Tippet and Mr. L. Rutty, who undertook the cultural investigations.

REFERENCES

- Bailey, D. (1952). *Lancet*, 1, 167.
Pitcher, R. S., et al. (1948). *Ibid.*, 1, 777.

SOME ASPECTS OF CATHETERIZATION IN RETENTION OF URINE

BY

J. A. LLOYD DAVIES, M.B., B.S., F.R.C.S.

The closed methods of prostatectomy introduced by Harris (1934), Hey (1945), and Millin (1945) require the absence of urethral and urinary sepsis for their safe performance. The undertaking of these closed operations on patients with urinary-tract infection offends surgical principles, and may lead to ascending pyelonephritis, wound sepsis and diastasis, and suprapubic urinary leak, despite the use of chemotherapy and antibiotics. It is clear that previous catheterization jeopardizes the patient's recovery if infection has been introduced with the catheter. This is particularly so in cases of acute or chronic retention of urine, in which immediate closed prostatectomy is now so often feasible. The advantages of this procedure need no emphasis when compared with the alternative of catheter drainage until urethral and bladder infection are well established, followed by suprapubic cystostomy, and transvesical prostatectomy at a later date.

Present Investigation

With this factor of urinary infection in mind, an investigation was carried out into a series of 117 consecutive patients admitted to hospital for the treatment of retention of urine caused by prostatic enlargement, fibrosis, or neoplasm. A history of any catheterization prior to admission was obtained, and the first specimens of urine collected in hospital were examined. In some cases these samples were midstream specimens, some were from suprapubic drainage of the bladder, others were obtained at prostatectomy or cystoscopy, while in a small group specimens were collected by catheterization when the patient's general condition precluded any other manoeuvre. A specimen of urine in which pus cells were seen on microscopy of the centrifuged deposit and from which pathogens were grown on culture was regarded as infected. The following results were obtained:

Total No. of cases	117	..	No. infected	31 (26%)
No. uncatheterized	86 (73%)	..	" "	15 (17%)
No. catheterized	31 (27%)	..	" "	16 (52%)

A further review with regard to frequency of catheterization disclosed the following:

No. catheterized once	13 (11%)	..	No. infected	3 (23%)
" " repeatedly	18 (15%)	..	" "	13 (72%)

In those patients who had been catheterized *Bact. coli* was present in only four, while the remaining 12 cases had mixed infections of two or more of the staphylococcal, coli, *Str. faecalis*, pyocyanus, or proteus groups. The corresponding figures for the uncatheterized showed a *Bact. coli* infection in ten and mixed infections in the other five cases.

It is not surprising that retention is sometimes associated with urinary infection even when no urethral instrumentation has taken place, for the stasis of urine in the bladder provides a relatively undisturbed haven for the growth of bacteria.

That previous catheterization in retention of urine should raise the numbers infected from 17% to 52%, and, in addition, noticeably increase the proportion of mixed infections is of grave significance. Particularly is this so in view of the relative insensitivity of many strains of these organisms to antibiotics and chemotherapy. It is not only in the patient's home but in the hospital out-patient clinics and wards that urethral catheters are passed. How may such catheterization be avoided?

The discomfort of acute or chronic retention is often such as to lead to urgent demands from the patient for relief. In these circumstances there are several courses open to the practitioner. The time-honoured method of trying to get the patient to micturate while he is sitting in a warm bath with the taps running is rarely of avail, and recourse is generally had to one of the following procedures: (a) giving the patient morphine and transferring him to hospital; (b) the passing of a rubber catheter, partial or complete decompression of the bladder, removal of the catheter, and the transfer of the patient to hospital; (c) catheterization and decompression, removal of the catheter, and the hopeful waiting for return of spontaneous micturition—this happy occurrence is by no means usual, and the catheter may be passed again and thereafter repeatedly; (d) the passing of a catheter and tying it in.

The Best Course

Which course should the practitioner adopt? Although the arranging of a patient's admission to hospital nowadays is sometimes a difficult and exasperating matter, there is no doubt that generally, so long as there is no excessive delay, this is the best course, with the patient adequately sedated and with no catheter passed. It is felt that, normally, recourse should never be had to repeated catheterization or the tying in of a catheter. The safe performance of a closed prostatectomy, in itself necessitating an indwelling catheter