# Furacin Ointment for Local Treatment of Burns

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THE local treatment of burns remains a subject for clinical study and various local applicants are being constantly tried. The recent trends in Western Countries and American Continent seem to favour treatment with silver Nitrate and Sulphamylon. The reported series from these countries do show that they are clinically effective. But Sulphamylon is not available in this country. Silver Nitrate treatment, as originally advocated, is too costly for us and in most places in India, it is modified to spraying techniques, which may not prove equally effective in controlling pyocyaneous septicemias. Thus in India, a suitable drug for local treatment of burns has to have, in addition to the usual clinical criteria, the quality of being cheap and easily applicable to a wide number of cases, under the existing poor organisational facilities, as available to most of the hospitals. Furacin Ointment appeared to have these qualities and so we decided to conduct a clinical trial with this ointment, to assess its effectiveness.

Furacin (5—nitro—2—furaldehyde semicarzone) is a yellow crystalline powder. Prepared in propylene glycol water soluble base, it can be dissolved upto a concentration of 1%. 2% water soluble preparation is used for local application to control infection of the open wounds. The drug was evaluated in vitro by Dodd and Stillman in 1944 and clinically assessed in infected battle wounds by Snyder, Kichn and Christopherson in 1945. Subsequent trials by Shipley and Dodd (1947) and by Shipley (1965), showed that his drug was bacteriostatic as well as bactericidal against many gram+ve as well as gram—ve organisms, that the base was non irritating and non toxic and that organisms did not develope any resistance against it, even after long continued applications.

Fig. 1—Shows the healthy granulation tissue ready for grafting

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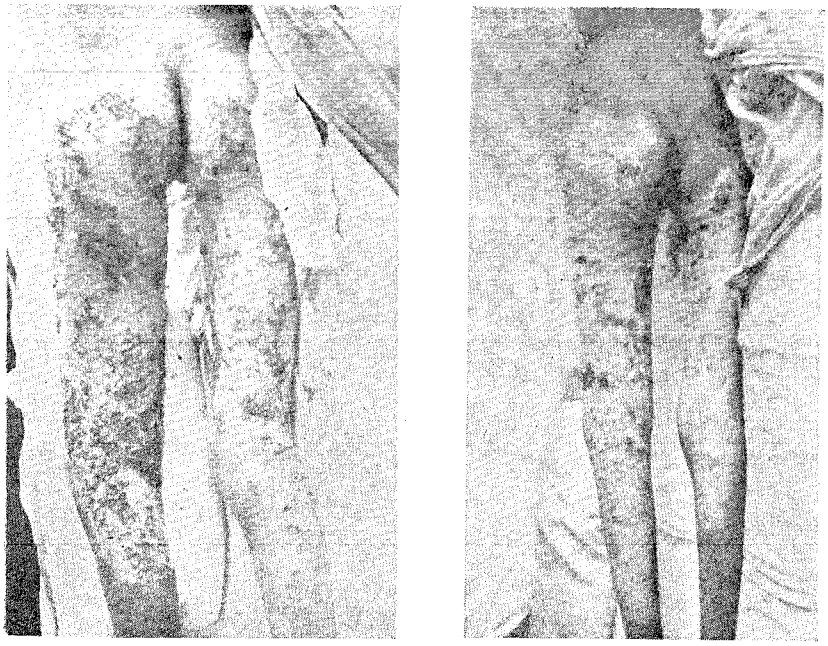

Fig. 2 & 3—A patient before and after Furacin treatment

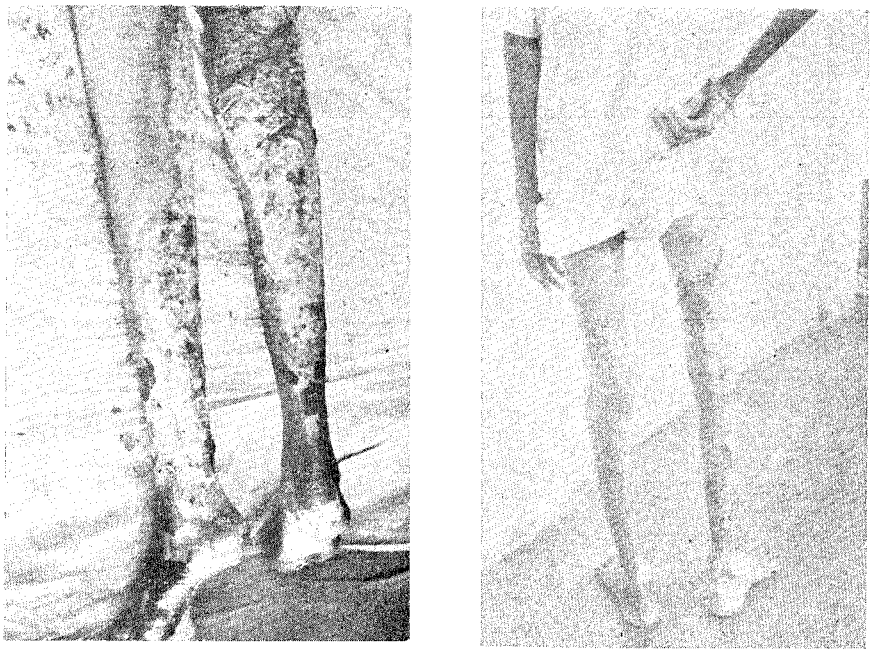

Fig. 4 & 5—Another case before and after Furacin treatment

In India, a clinical trial for infected wounds was conducted by Y. Krishna (1970) and he reported good results. But no clinical trials for local treatment of burns have been reported so far, from any centre in India.

**Method and Material**

After recording all relevant clinical data, a swab for culture was taken, sensitivity of the grown organisms against antibiotics and Furacin were tested. Furacin Ointment was applied over the whole burnt area with a sterile spatula, while in some cases, specially prepared Furacin gauze was applied, over the whole surface. The applications were done, twice a week. In deep burns, scales and sloughs were removed gently, without anaesthesia, as and when they separated. The cultures and sensitivity tests were repeated, at the end of a week and on or about the 21st day. The same local treatment was continued, irrespective of the culture reports, once treatment with Furacin was started. In deep burns, as soon as the area was clean and all eschar was removed, skin-grafting was advised and performed if the patient was willing. Some patients refused operation and they were continued on the same treatment locally, till the wounds healed. The treatment of shock, the adjuvant treatment of nutrition, systemic antibiotics etc. were carried out as usual but are irrelevant to the present discussion.

In all 71 cases of burns were thus treated and the clinical data is being presented.

**Incidence**

There were 33 Males and 38 Females, Out of these 22 were children. Even excluding these children, the incidence of burns among females was not found to be any higher. 20 Males and 29 Females. The age incidence is shown below. (Table I) Causes of burns could be mainly put into three categories.

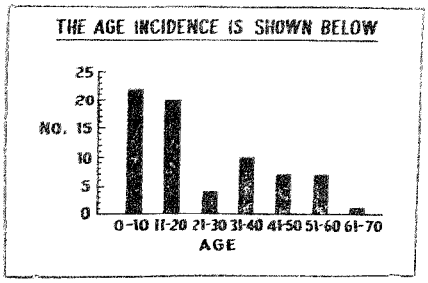


Table I

1. Burns while working (Industrial burns)—11
2. House-hold work (Clothes catching fire—38
   (6 Epileptics)
3. Hot water or Oil falling on the body —20
   (2 Epileptics)
4. Suicidal burns... ..... ..... ...2

Epilepsy seems to be an important pre-disposing cause, as many as 8 patients getting burns during an epileptic fit.

**Severity of Burns**

The degree of burns was classified as superficial or deep burns.

There were 32 cases of superficial burns and 39 cases of deep burns.

**Percentage**

As the number of cases is small and variations in clinical responses are more important in the study, the cases were divided into only 4 broad categories as regards the percentage of body surface burnt (Table II).

In cases of deep burns of more than 25% where Furacin Ointment was applied, right from the beginning, the average stay was actually 75.3 days. There were 6 cases, in which patients came under the treatment, after having had irregular treatment earlier,

Table II

| Percentage | 0-10% | 11-25% | 26-50% | More than 50% |
|---|---|---|---|---|
| Number | 32 | 18 | 17 | 4 |
| Mortality | 0 | 0 | 2(12%) | 4(100%) |
| Average Hospital Stay | 19 days | 39 days | 104 days | - |

but as they were also offered the benifit of similar treatment with Furacin Ointment, they were included for statistical completeness. They obviously increased the average substantially to 104 days. Yet another reason was that some patients, when they were ready for skin-grafting, refused operation, because they felt the progress was satisfactory and we had to allow their wounds to heal slowly. These patients required about 100 to 125 days to heal. Where full proper regime was applied and skin grafting could be done, the average stay was between 50 to 70 days.

Skin grafting was advised on 22 occasions but 6 patients refused operation, and so skin-grafting was actually done in only 16 cases. Considering 75 to 80% take as a successful result, 11 cases were successful i.e. 68.75% of cases were successful. In the other 5 cases, grafts took only partially or not at all.

No clinical study on this subject will be complete without bacteriological study. As already stated culture and sensitivity patterns were studied within 48 hours, at one week and at the end of 3 weeks. In cases, having a prolonged course, cultures were done in addition, whenever needed. In many cases of superficial burns and others where healing was quick, often the later cultures were not done. In all, there are 144 culture studies available. The comprehensive table is shown below (Table III). The important facts that emerge from the study are.

Table III

| Organism | No. | Percentage | Penicillin | Streptomycin | Chloramphenicole | Tetracyclin | Aureomycin | Erythromycin | Furacin |
|---|---|---|---|---|---|---|---|---|---|
| Staphylococci Coagulase + ve | 72 | 32·4% | 67% | 73% | 90% | 90% | 73% | 54% | 85% |
| Coliform Bacilli | 53 | 24·3% | 58% | 72% | 95% | 84% | 78% | 33% | 95% |
| Staphylococci Coagulase - ve | 21 | 9·5% | 71% | 57% | 86% | 86% | | | 86% |
| Proteus Vulgaris | 18 | 8·1% | 33% | 33% | 83% | 75% | 75% | 33% | 33% |
| Streptococce | 12 | 5·4% | 100% | 100% | 100% | 100% | | | 100% |
| Alkaligenes Foecalis | 12 | 5·4% | 75% | 75% | 75% | 100% | 50% | 50% | 50% |
| Pseudomones Pyocyanea | 15 | 6·8% | 20% | 20% | 40% | 60% | 40% | | 20% |
| Klebsiella | 10 | 4·1% | 100% | 33% | 100% | 68% | 100% | 100% | 70% |
| Gram-ve Cocco-bacilli | 9 | 4% | 67% | 67% | 67% | 100% | | | 67% |

(i) As is always found, often more than one organism were found on culture.

(ii) Coagulase +ve staphyllococci and Coliform Bacilli are the commonest organisms found and they account for more than 55% of the organisms found.

(iii) Coagulase negative staphyllococci also show an incidence of nearing 10%.

(iv) Furacin is very effective against these common organisms 85% to 95% of them being sensitive to it.

(v) Previously sensitive strains never developed resistance to the drug, due to continous use. However, sometimes patients may grow different strains which are resistant to the drug, like Proteus Vulgaris or Ps. Pyocyaneus.

(vi) However, Furacin was not effective against Ps. Pyocyaneus, Proteus Vulgaris and Alkaligenes Foecalis, and hence would not be effective against pyocyaneus septicemia.

(vii) For systemic use, Tetracyclin was the best drug, with chloromycetin a close second in efficicacy.

**Additional Clinical Impressions**

There were other obvious benifits e.g. it was observed that toxaemia and the resultant anaemia and mal-nutrition were much less than in cases of similar nature treated without Furacin. The conversion of superficial to deep burns due to secondary infection, was not encountered and in general healing was faster. The markedly reduced average stay in the hospital and a markedly reduced morbidity like contractures will be apparent only to those who have long experience of the conditions prevailing in general wards in most of the hospitals. Where special burns wards and burns centres are organised, the results may be as good or even better. But one has to assess these results, in the highly handicapping conditions of the general ward set-up of our hospitals. It is our feeling, that local treatment of burns by Furacin Ointment has been an important contributing factor to the vastly improved clinical results, as presented in this small series. Thus, the advantages of Furacin treatment as observed are,

(i) It is cheap and a readily applicable method of treatment under ordinary general ward set-up.

(ii) It needs application only twice a week.

(iii) It is effective against most of the common infecting organisms found over the burns wounds.

(iv) Resistant strains have not emerged after its continued use.

(v) It effectively prevents change of superficial to deep burns, due to secondary infection.

(vi) It does not interfere with good graft-take. If at all it seems to improve the results of skin-grafting.

**Its disadvantages are**

(i) The Furacin gauze method takes away, to some exted, the advantages of exposure method of treatment.

(ii) It is not effective against some of

the strains that are lethal to patients like Pyocyaneous and Proteus Vulgaris.

(iii) In comparison with reported Wester series, it does not seem to be as effective as Sulphamylon, or fully and properly implemented silver nitrate therapy.

**Discussion**

The search for the ideal drug for the local treatment of burns continues. Carl Mayer (1965) defines the qualities of an ideal local antiseptic as one which (i) is Non-toxic (ii) is soluble in water (iii) has a prolonged local action (iv) is non-toxic to cells and does not interfere with healing or skin-grafting (v) is non-antigenic (vi) is readily procurable and (vii) for which resistant strains do not develop. Lindberg et all (1965) stress almost the same qualities in an ideal local antiseptic. In India, there are possibly some additional requirements, namely, it should be very cheap and the method should be readily applicable in our ordinary hospital set-up with their small budgets and lack of para-clinical personel.

Furacin ointment treatment satisfies most of the criteria. The present trial proves that it is non-toxic, non irritant, non antigenic. The application is needed only twice a week and hence the drug seems to have prolonged action. As already shown, the healing-time is markedly reduced and it does not interfere with the graft take, nearly 70% being very successful. No resistant strains have emerged. This has also been confirmed by Shipley (1965) who found no change in the sensitivity pattern 17 years after the continued use of the ointment. In addition, we found that it is specially useful in our local circumstances, as it is very cheap, requires application only twice-a-week and is eminently suitable under extremely ordinary hospital set-up, such as is available in our country.

The comparison of Furacin with other topical agents used in burns brings forth interesting findings. Phenols, organic mercurials, Picric acid, etc. were rapidly discarded as being too toxic to cells locally and after absorption (Moyer 1965). Clinical as well as experimental evidence has proved the greater efficacy of the exposure method over the occlusive dressing method (Holman et al. 1956) and by now the former is almost universally accepted. The other local treatments used are Chlorhexidine (Low burg, 1957), Neomycine with Tulle Gras, and Polybactrin spray (Lowbury et al 1962). The results of these trials show that they are less effective than Furacin method of treatment. All these methods, suffer from a common drawback, that they are not effective against gram —ve organisms especially Pseudomonas pyocyaneus. Furacin also suffers from the same draw-back.

In recent years, treatment with 5% silver nitrate (Moyer 1965) and with sulphamylon (Lindberg et al. 1965, Moncrief 1970) have shown vastly improved results. Both these agents are found to be highly effective against Pyocyaneus infections. But both these treatments appear to be very costly. Sulphamylon is not yet available in India, while the properly implemented silver Nitrate therapy requires 2 hourly application of silver-nitrate over 20 layer gauze dressing

which must be changed twice a day (Moncrief 1970). Secondly, the permanent staining of linen and other material creates a real logistic problem. In both these treatments, electrolyte imbalances are great hazards and it is necessary to do electrolyte studies frequently and give proper replacement fluids. The danger is very great especially in children. Silver Nitrate treatment again is not much effective, unless it is started immediately. The present study shows that Ps. pyocyaneus accounts for only 7% of the infecting organisms, whereas E. Coli Staphyllococci and streptococci account for more than 70% of the infecting organisms.

Thus we feel that though silver-nitrate is definitely more useful, if properly used, it is a costly treatment and can be undertaken in major hospitals only where facilities for electrolyte studies and replacement are available. It should be used for very major burns (i.e. of more than 30 to 40% body surface burns). All the rest of the burns superficial or deep can be effectively treated with the Furacin ointment with expectation of excellent results. That will reduce the over-all expenditure on the treatment of burns, without jeopardising the ultimate results. In our country, ultimately, the large mass of patients are going to need *good* treatment at *cheap* cost with *simple* methods of treatments, the more elaborate and costly methods being reserved for the more serious type of cases. The present clinical trial indicates that Furacin treatment is highly satisfactory if we apply these considerations to the treatment of burns.

**Summary**

Furacin Ointment is one of the drugs used for the local wounds of burns but has not been clinically assessed in India, so far. This is a review of the clinical trial of the drug conducted in the general hospital set-up. 71 cases were treated with Furacin Ointment applied locally twice a week. 32 were superficial burns and 39 were deep burns. The data of incidence, causes, the percentage of body surface burnt etc. are presented, as also the results of the treatment, as judged by the average hospital stay, and skin-graft take. The hospital stay was markedly less as compared with those who were treated on other lines of local treatment. Considering 80% take of the graft as successful 70% had good results, after skin-grafting. Detailed bacteriological study was also carried out, and the relevant data is presented.

The review indicates that Furacin is very useful, and improves the clinical results, it is cheap and easily applicable method under any set-up, it is effective against organisms that commonly infect the burns wounds but not effective against Ps. Pyocyaneus and proteus group.

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