gut and not from its excessively rapid utilization by the tissues. In three children with *tabes mesenterica* Ross (1936b) also found oral curves of a flat type associated with intravenous curves of high type, and concluded that defective absorption of carbohydrate was responsible for the decreased glucose tolerance manifested by these patients. In the present series of cases the glucose tolerance following the intravenous injection of glucose was not determined, but in the *steatorrhoeas* flat oral glucose curves are often found in association with high faecal fat, and it is evident that defective absorption of both glucose and fat frequently occur together. Verzář (1936) has recently shown that phosphorylation controls the absorption of both fatty acids and glucose in the cells of the intestinal mucosa. Perhaps under the conditions of intestinal lymph stasis described in this paper the phosphorylation process is defective, and lowering of the absorption gradient for both these substances results.

Conclusions

1. A sprue-like syndrome associated with lymphoma, lymphadenoma, and lymphosarcoma of the mesenteric lymph glands is recorded in adults.
2. *Steatorrhoea* was present in all four patients, one of whom died with severe tetany and hypocalcaemia.
3. Flat oral glucose tolerance curves similar to those encountered in sprue were found in both cases investigated from this viewpoint.
4. It is suggested that defective intestinal absorption resulting from lymphatic obstruction is responsible for the biochemical and clinical findings recorded above.

We wish to acknowledge our indebtedness to Dr. Adolphe Abrahams, Dr. R. J. V. Pulvertaft, Dr. Forest Smith, Mr. F. Wilson Harlow, and Dr. G. H. Garnett for supplying the detailed clinical and pathological data included in certain of the case histories.

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Mary Gover (*Publ. Hlth. Rep. Wash.*, October 9, 1936, p. 1399) states that six of the seventeen years since the summer of 1919 have failed to show more than the seasonal expectancy of deaths from influenza and pneumonia. During the other eleven years recognizable outbreaks of influenza have occurred. Mortality in about ninety-five cities scattered throughout the United States shows that the total excess mortality in these epidemics has varied from 99.3 per 100,000 from influenza and pneumonia in 1919–20 to 5.4 per 100,000 in the winter of 1934–5. In the winter of 1935–6 there were two periods of high mortality—namely, from December 20 to January 18 and from February 9 to May 2. The reported cases in forty-four States and New York City roughly paralleled the curve of mortality for 1935–6. From December 29 to May 2 there were 121,011 cases of influenza reported, an excess of 78,213 cases over the number reported in the corresponding period for 1934 while the incidence of influenza was low. The epidemic of 1936 started in the West South Central section and spread through the Southern States to the east coast. In both the West and East South Central areas mortality from influenza and pneumonia continued well above the normal expectancy from December, 1935, to the first part of May, 1936. It did not, however, reach extreme proportions in any section.

TREATMENT OF MINOR BURNS BY AMYL SALICYLATE AND OTHER SALICYL ESTERS*

BY

R. LESLIE STEWART, M.B., F.R.C.S.Ed.

Assistant Surgeon, Edinburgh Royal Infirmary

(WITH SPECIAL PLATE)

Injuries due to burns and scalds may be divided into two main classes: (a) severe and extensive injuries, where life is endangered by shock and the onset of acute toxæmia; (b) less extensive injuries, in which the problem of acute toxæmia does not arise. Cases within the former category need urgent admission to hospital, and the injuries should be treated with tannic acid: cases within the latter category are commonly met with in hospital out-patient departments, and it is solely with these that this paper deals. In treating these less extensive injuries one should aim at employing methods which so far as possible satisfy the following criteria: (1) simplicity of application and infrequent changing of dressings; (2) alleviation of pain; (3) control or eradication of sepsis; (4) minimal overgrowth of granulation tissue on raw surfaces; (5) absence of local or general skin irritation and dermatitis; (6) relatively rapid and sound healing without contractures. For hospital practice, with a constantly changing staff of nurses and dressers, it has been difficult to standardize a sufficiently simple technique, and even when this is attained the results are prone to be upset by the patients themselves, often through a desire to return to work too early, or from unsatisfactory home surroundings and lack of personal cleanliness. For these reasons one cannot but expect occasional disappointments in patients who otherwise should have done well.

At the invitation of the Therapeutic Trials Committee of the Medical Research Council, and through the courtesy of Sir David Wilkie, I have during the last four years carried out an extensive series of clinical tests on the efficacy of certain salicyl esters in the treatment of burns and scalds, all the work being done in the surgical out-patient department of the Edinburgh Royal Infirmary. Various esters have been tested and some hundreds of cases have been treated, as it was considered that little importance could be attached to the results obtained in a small number of experiments.

The circumstances which led to the investigation are of some interest. Salicyl esters, notably methyl salicylate and butyl salicylate, have long been known to have analgesic properties, and amyl salicylate itself was introduced in London as a treatment for burns by Messrs. Strange and Graham (chemists) many years ago. It was tried at Guy's Hospital, but its use was abandoned on account of its smell. This has since been made somewhat less disagreeable by greater purification, and a member of the staff of Messrs. Spencer, Chapman, and Messel, Ltd., heavy acid manufacturers, of Silvertown, having heard of the analgesic properties of the ester, tried it in minor acid burns. His firm were so impressed with the healing obtained in the first few cases that they communicated the news to other firms, one of which (Messrs. A. Boake, Roberts and Co., Ltd.) applied to the Medical Research Council for further information as to the safety and utility of the treatment. The Council's Therapeutic

* A report to the Therapeutic Trials Committee of the Medical Research Council. From the Department of Surgery, University of Edinburgh.

Trials Committee agreed to arrange an investigation of the question, and the work was entrusted to me and my colleagues at Edinburgh. Messrs. A. Boake, Roberts and Co., Ltd., are manufacturers of the salicyl esters, and have supplied large quantities of these substances for the tests. They are also the makers in this country of "abracide," a liquid mixture of isomeric methyl tertiary butyl phenols, which has been found in suitable concentration to blend satisfactorily with amyl salicylate so as to produce a stable analgesic and antiseptic solution.

Amyl Salicylate

In the first series of clinical tests amyl salicylate alone was used, and it was early apparent that this ester was definitely analgesic when applied to the raw surface of a burn or scald. Very satisfactory healing was obtained in approximately two-thirds of the cases treated, but in the remaining third, owing to the presence or onset of relatively mild local sepsis, healing was delayed and antiseptic dressings, such as flavine, had to be substituted. This was not unexpected in view of the fact that laboratory tests had already demonstrated that amyl salicylate has little or no bactericidal power. None of the patients showed evidence of salicylate poisoning or of general toxic absorption. On the other hand, a certain amount of local skin irritation was seen, but in the light of our subsequent findings it seems probable that this was chiefly due to the unnecessary frequency with which the dressings were at first changed.

Amyl Salicylate and Antiseptics

The next stage of the investigation was to treat a series of cases along the same lines but with the addition of an antiseptic to the amyl salicylate. Various combinations were tried and tested bacteriologically before we decided to employ dichloramine-T, because this, unlike many other antiseptics, was found to be readily miscible with amyl salicylate and to give an almost clear solution when used in a concentration of 1 per cent. in the ester. The strength of the solution had later to be reduced by half, since several of the patients complained of considerable discomfort with the higher concentration of dichloramine-T.

Approximately eighty cases of burns and scalds were treated with this mixture. Healing progressed satisfactorily in 90 per cent. of these, but in the remainder some degree of sepsis occurred. The results, on the whole, were thus superior to those obtained with amyl salicylate alone, but even with the dichloramine-T at a strength of only 1/2 per cent. the patients were apt to complain of more discomfort than hitherto, and a further serious disadvantage lay in the fact that the solution was unstable; it quickly lost much of its antiseptic value, and so had to be freshly prepared each day. A certain degree of cutaneous irritation and desquamation continued to cause trouble. On these grounds it was decided that the dichloramine-T mixture was not satisfactory, and another series of tests was begun with amyl salicylate and abracide. In addition to combining well with amyl salicylate, abracide has been shown to possess good germicidal properties, and was claimed to be relatively non-toxic and non-irritating to the tissues.

Fifty-one cases of injuries from burns and scalds were treated, employing a low concentration—namely, 1 in 1,000 of 5 per cent. abracide solution in amyl salicylate. Of these fifty-one cases very satisfactory healing was obtained in thirty-four, the average duration of the treatment being a little over a fortnight. In fourteen cases

there was somewhat delayed healing owing to slight sepsis, and more active local infection was encountered in the remaining three patients, though the eventual results were satisfactory. The longest period of active treatment in this group was sixty days. In evaluating these results it should be noted that in certain instances the injuries had been sustained one to three days before the patients came to hospital, and especially in these, but also in some others, infection was already present. As in the previous series, there was often considerable scaling and itching associated with cutaneous congestion even after the lesions had healed. Three patients developed a dermatitis venenata, which in one instance was quite severe. All three had skin tests, and were found to be hypersensitive to amyl salicylate, though not to salicylic acid. No other symptoms indicative of either salicylate or phenol poisoning were met with in our patients.

Benzyl and Methyl Salicylate

Especially in view of the extremely penetrating smell of amyl salicylate it was decided at this stage to test some other salicyl esters under the same conditions. Benzyl salicylate and methyl salicylate were successively used, but apart from alteration and diminution of the odour emanating from the dressings they appeared to have no advantages over amyl salicylate. The results, on the whole, were inferior to those already obtained in regard to sepsis; cutaneous irritation was, if anything, more pronounced, while the analgesic properties of these esters appeared to be distinctly less. Indeed, where discomfort was specially complained of it was found that a change over to amyl salicylate sometimes gave immediate relief.

For the above reasons it appeared that amyl salicylate was the ester of choice, and we now set out to improve the technique of its use in order to decrease the incidence of infection, and obviate, if possible, the occasional irritative dermatitis which seemed to synchronize with a somewhat exuberant growth of granulation tissue on the raw area of the burn or scald. The content of abracide in the mixture was therefore increased to 1 in 10,000 (or 1 in 500 of the 5 per cent. commercial solution), and the changing of the deep or surface dressings was reduced to a minimum. As an outcome of these changes in the method of application our results showed a marked improvement and it is therefore proposed to give a short account of the main features of the technique employed and a summary of the results obtained in a series of forty consecutive cases treated during the past year.

Technique of Treatment

When the patients present themselves at hospital the affected area is cleansed with normal saline, and all raised epithelium is removed. An anaesthetic is rarely needed for minor burns, except in children or where the burnt area is heavily coated with some adherent domestic remedy, such as flour. Spirituous solutions are avoided. Swabs soaked in amyl salicylate and abracide are applied direct to the area, that in actual contact with the raw surface being only two or three layers of gauze in thickness. Wool and a bandage are then adjusted. The patient subsequently attends at four-day intervals, when, if possible, only the outer swabs are removed and the thin one next the lesion is left *in situ*. Fresh outer swabs, wrung out of the amyl salicylate and abracide solution, are applied after any excess of serous discharge has been wiped away. As the burnt area dries up and epithelium grows over it the lowest or primary gauze layer loosens off, and when it completely separates the lesion is found to be healed. Under such conditions the patient has no pain,

and no cutaneous irritation or erythema has so far been met with.

In some instances, owing to a more active exudation, such an "ideal" technique is impossible, and the entire dressing requires to be changed once or even oftener. On occasion there is some scaling or even crusting after the main part of the surface has healed, and olive oil is applied until the scales or crusts separate. Otherwise simple dry gauze dressings are used to protect the recently healed area for a few days.

Results

Very trivial injuries being discounted, forty-two consecutive and unselected cases were treated during the period under review. Two of these cases have been discarded, as the patients, though both doing well, did not complete their treatment at hospital. Another patient (No. 15, Table A) has not been included in the analysis of results (Table B), again on account of ceasing attendance prematurely. Of the remaining thirty-nine patients, twenty-six were males with an average age of 27 years, and thirteen were females with an average age of 25 years. Scalds accounted for most of the injuries, there being twenty-seven of these as against five burns by flames, four by hot or molten metal, two electric burns, and one burn by lime.

Distribution and Extent.—In most cases the limbs were affected, especially the arms, and it was found, as would be expected in patients treated on ambulatory lines, that injuries to the arms and hands tended to do better than those on the legs and feet. The injuries were frequently multiple, but these have been considered as separate entities in the appended tables only where the duration of treatment has shown any marked disparity. The extent of the involved area varied. In some it was relatively small, but in others it was of considerable size—for example, the whole of one aspect of the forearm and wrist, or the lower third of the leg and whole dorsum of the foot. Lesions of the fingers accompanied practically all those affecting the hands.

Degree, Duration, and Initial Sepsis.—In five patients the burns were of third degree, in the remainder they were of second degree (Dupuytren's classification). It will be noted in Table A, under the heading "Duration" (the approximate interval between the time of the injury and the first hospital treatment), that most of the patients presented themselves within a few hours. In eleven cases, however, they did not come until one or more days had elapsed, and there was therefore potential or actual sepsis present from the outset of hospital treatment. In certain cases, even when treatment was begun on the day of the injury, there was already a slight degree of infection, frequently due to the application of some unsuitable domestic remedy. In Table B it will be seen that there is a direct relationship between the depth of the lesion, the presence of sepsis, and the length of time required for treatment.

The Process of Healing.—The results in this series were almost uniformly good. Healing progressed steadily, and it was seldom that any of the patients complained of really appreciable discomfort. Especially when the primary surface dressing remained intact and there was no excessive exudation, the treatment was painless throughout. There was a noticeable absence of exuberant granulation tissue, and no cases of dermatitis were met with. The resulting scars were smooth and pliable, though some showed a little surface scaling, which soon disappeared. No contractures occurred. Another point was that straight-

TABLE A

Case No.	Injury	Sex	Age	Duration in Hours	Degree	Site	Initial Sepsis	Duration of Treatment in Days	Result
1	Scald	M	60	6	2nd	Arm	Mild	19	Good
2	Scald	M	24	4	"	Shoulder Both feet	Slight	28	"
3	Burn	M	16	2	"	Fingers	Nil	16	"
4	Scald	M	1	1	"	Arm	"	20	"
5	Burn	M	19	1	"	Hand	"	12	"
6	Scald	M	18	3	"	Both hands	"	30	"
7	Burn	M	24	24	3rd	Leg	Mild	16 65	"
8	Burn	M	41	2	2nd	Forearm	Nil	7	"
9	Scald	F	25	6	"	Face Wrist	Mild	16	"
10	Burn	M	28	3	"	Both hands	Nil	12	"
11	Scald	F	20	22	"	Elbow	Mild	11	"
12	Burn	M	28	2	"	Both hands	Nil	10	"
13	Burn	F	15	3	3rd	Fingers	Slight	34	"
14	Scald	F	3	23	2nd	Forearm	V. mild	28	"
15	Acid burn	M	63	2	3rd	Toes Shoulder	Attended for twenty-two days, lesions then satisfactory but not quite healed		
16	Burn	M	38	1	2nd	Forearm face, neck Wrist	Nil	15 7	Good
17	Scald	M	33	2	"	"	"	16	"
18	Scald	M	14	1	"	Forearm	"	15	"
19	Scald	M	20	2	"	Hands & fingers	V. mild	26	"
20	Scald	M	28	72	"	Arm	Severe	45	Fair
21	Scald	M	43	2	"	Ankle, leg, foot	Nil	28	Good
22	Scald	M	58	2	"	Arm	"	11	"
23	Scald	F	40	72	"	Knee	Mild	28	"
24	Scald	F	38	2	"	Leg	Nil	28	"
25	Burn	M	50	4	3rd	Wrist	"	53	"
26	Scald	F	38	48	2nd	Elbow Foot	Mild	28 14	"
27	Burn	F	4	1	"	R. knee L. knee	Nil	15 40	"
28	Burn	M	28	3	3rd	Fingers	"	27	Fair Good
29	Scald	M	5	3	2nd	Foot	"	24	"
30	Burn	M	26	46	"	Hand	"	13	"
31	Scald	F	27	2	"	Leg	"	14	"
32	Scald	M	16	20	"	Hand	"	17	"
33	Scald	F	15	1 wk.	"	Leg	Moderate	15	"
34	Scald	F	40	5 dys.	"	Foot	Marked	36	Fair
35	Scald	F	23	12	"	Foot	Moderate	34	"
36	Scald	M	14	3	"	Foot	V. mild	18	Good
37	Scald	M	7	2	"	Foot	Nil	16	"
38	Burn	M	15	1	"	R. hand L. hand	"	15 7	"
39	Scald	F	16	24	"	Foot	Mild	24	"
40	Burn	F	20	2	3rd to 4th	Forearm and wrist	?	38	Fair

TABLE B.—Thirty-nine Patients: Forty-four Separate Injuries

Injuries	Number	Average Duration of Treatment in Days
Second degree with no infection ...	24	16.8
Second degree with mild infection ...	11	22.4
Second degree with moderate or severe infection ...	4	35
Third degree with little, if any, infection ...	4	36.5
Third degree with infection ...	1	65

forward healing was obtained in a number of cases in which there was some degree of initial sepsis. In five cases the result has been classified as only "fair," more on account of the fact that some sepsis was encountered during treatment than because the eventual result was not satisfactory. Only in two of these five cases was it necessary to substitute stronger antiseptic measures for a day or two during the course of the treatment. Further, it will be noted from Table A that in three of these patients initial sepsis of more or less marked degree was present when they first attended, and in another the burn was a deep and extensive one on the forearm (No. 40). One other case (No. 7) calls for special mention. This patient was an epileptic, and sustained a third-degree burn of relatively small size, but situated in the avascular scar of an old burn of the leg. Healing was accordingly slow, and he had to attend for sixty-five days.

Illustrative Cases

Case I (No. 24).—The patient was a female aged 38. She was seen on April 8, 1936, two hours after a scalding accident to the right leg. Examination showed a four-inch by three-inch second-degree lesion above the right internal malleolus. Primary dressings as above. Healing progressed very satisfactorily, with no exudation through the surface gauze layers. A photograph taken on April 27 shows the surface gauze in position, and a second one, taken on May 5, after the gauze had separated spontaneously, shows a perfectly healed skin area with slight scaling in its centre (see Special Plate). No pain throughout.

Case II (No. 16).—The patient was a male aged 38. He sustained second-degree burns of the face, neck, and whole length of the left forearm, caused by a blow-back from a furnace. The accident occurred on March 23, 1936, and he attended hospital one hour later. The raised epithelium was removed and the surfaces cleansed with saline. Amyl salicylate and abracide dressings were applied. The gauze layers in actual contact with the raw surfaces were left intact, and only the top layers were changed at three- and four-day intervals. Progress was rapid. By March 30 the lesions on the face and neck were healed, and by April 7 the forearm was likewise fully healed. No pain throughout. Comment: A recent, clean second-degree burn; primary surface dressing remained *in situ*.

Case III (No. 39).—A girl aged 16 was scalded on the right foot on June 4, 1936. A thick layer of flour was applied at home, and she attended hospital on June 5. Examination showed an extensive, moist, mildly infected second-degree lesion over the dorsum of the foot and the front of the ankle. In this case there was some exudation, so that the whole thickness of the dressings had to be changed three days later. Thereafter, though there was a minor degree of exudation, the deep surface gauze was left intact and healing progressed satisfactorily, being complete by June 29. There was some discomfort during the first five days of treatment. Comment: A mildly infected injury of twenty-four hours' duration, which, however, progressed satisfactorily.

Case IV (No. 34).—A woman aged 40 attended on May 28, 1936, with a five-days-old second-to-third-degree lesion on the foot caused by a scald. There was a brown slough in the centre and the surrounding skin was congested and swollen. Considerable pain. After gentle cleansing amyl salicylate and abracide dressings were applied. Owing to the nature of the case there was considerable exudation of sero-pus, and the whole thickness of the dressings had to be changed at four-day intervals. By June 15 the condition was painless and the surface very clean. Healing was complete by June 29. Comment: A quite markedly infected burn treated throughout by amyl salicylate and abracide.

Summary

1. Clinical tests in a hospital out-patient department have indicated that amyl salicylate possesses analgesic

properties, and can be satisfactorily employed in the treatment of minor burns.

2. It lacks the coagulant effect of tannic acid on the tissues, and is therefore unsuited to the treatment of severe and extensive burns where there is a danger of toxæmia and shock.

3. The ester has little if any bactericidal power, and it therefore requires the addition of an antiseptic. In this series a mixture of isomeric substituted phenols, known by the trade name "abracide," has proved suitable.

4. The method is applicable to the treatment of infected as well as non-infected burns and scalds, provided the initial infection is not too severe.

5. Standardization of technique is very necessary if the best results are to be obtained.

6. Amyl salicylate has an extremely penetrating smell, but the results obtained with other less pungent salicyl esters have been inferior.

I am indebted to Dr. T. H. Durrans, director of research and development to Messrs. A. Boake, Roberts and Co. Ltd., for advice and assistance throughout the inquiry. I am also sincerely grateful to Sister Dewar of the surgical out-patient department of the Edinburgh Royal Infirmary; without her constant supervision of the work of her staff the investigation would have been impossible.

A NOTE ON LITHOPAEDION WITH REPORT OF A CASE

BY

PAUL CAVE, M.B., D.M.R.E.

Honorary Radiologist, Royal Berkshire Hospital

(WITH SPECIAL PLATE)

Of all pathological conditions lithopaedion probably excites the most curiosity, and for this reason few cases escape being reported. In spite of this tendency to over-publicity the number of cases in the literature is relatively few. For instance, up to 1933 the total was 196 cases, and the number added since then is insignificant. Another illustration of its rarity is derived from the figures of the Mayo Clinic for the years 1903 to 1926. During this period nine lithopaedions were found in 445 cases of extra-uterine pregnancy. The incidence of 2 per cent. is probably the highest that will ever be recorded, as with increased recognition of a retained foetus lithopaedion formation will become still more rare. The paucity of cases is not surprising when one considers the combination of circumstances which must be present before a lithopaedion can be formed.

First, the pregnancy must be extra-uterine. It is true that about half a dozen cases of intra-uterine lithopaedions are reported in the very early literature, but since none have appeared within the last hundred years it is rational to view their authenticity with extreme scepticism. Nor is it possible to discover a case of lithopaedion in the record of pregnancies in bicornuate uteri. Even in a case in which almost full-term twins were retained for twenty years in a bicornuate uterus there was skeletonization, but no calcification.

Secondly, the foetus must survive for longer than three months. If death occurs while the bones are cartilaginous absorption will be rapid and complete. In tubal pregnancy advanced development is rare, and if the tube ruptures on its free side the embryo usually dies in the peritoneal cavity. But secondary intraligamentous implantation is said to favour survival.

N. HAMILTON FAIRLEY AND F. P. MACKIE: THE
CLINICAL AND BIOCHEMICAL SYNDROME IN LYMPH-
ADENOMA AND ALLIED DISEASES

Lymphoma of the mesenteric lymph glands associated with lymph stasis and a sprue-like syndrome. (Case I.)

PAUL CAVE: CASE OF LITHOPAEDION

Antero-posterior view.

R. LESLIE STEWART: TREATMENT OF MINOR BURNS BY AMYL SALICYLATE AND OTHER
SALICYL ESTERS

FIG. 1.—Case I (No. 24). Scald on leg. Primary surface dressing still adherent nineteen days after commencement of treatment.

FIG. 2.—Case I (No. 24). Eight days later. The primary gauze layer has been shed. The injury is perfectly healed with slight surface scaling seen in the centre.