Is a moderate eater, his digestion is fairly good, but he has suffered from dyspepsia, for which he got much advantage from Burroughs, Wellcome and Co.'s laxative tablets and 1 grain of calomel weekly. Has been a golfer for twenty years. He gets dripping wet from perspiration before the ninth hole is reached, and used to remain soaked till he changed for dinner. Three weeks since had a bad blow over liver from a motor car.

On his arrival he was markedly depressed and neurasthenic, said he was no longer able to do his work, talked of retiring, and was much troubled in consequence; doubted whether any cure could save him, etc., was too obese. The first urine analysis showed a very fair ratio between the different normal elements, though all were very much below the average. What, however, was unsatisfactory was the presence of 10.35 grams of glucose per diem.

CASE V.—Rev. J. W. R. August 13th, 1910: Specific gravity 1024.5. Glucose 10.35 grams per twenty-four hours. True biliary pigments sensible. Indican and scatol marked. Purins 0.391. Numerous crystals of uric acid in rosettes and isolated, some leucocytes. August 22nd, 1910: Glucose 3.10 grams per litre after a meal. September 1st, 1910: Specific gravity 1028. Glucose nil. Faint traces of indican and scatol. Purins 0.319. Large and small crystals of uric acid. Very rare leucocytes. V, Volume; S, solids; A, acidity; U, urea; UA, uric acid; C, chlorides; P.A., phosphoric acid.

His diet was suitably modified, and he soon worked up to nine classes per diem of "Source Salée." He had a massage under water every other day at 42° C., followed by a rub down with Vigorax.

Eight days later he felt much better, and we found 3.10 grams of glucose per litre.

On September 1st he felt quite fit to return to work. His blood pressure had fallen to 145 mm., with same capillary reflux and pulse. He had lost 3,280 kilos in weight, or over 7 lb. An analysis showed a marked improvement with a rise of all the elements. This is specially remarkable for the urea and phosphates, though the uric acid was still in part retained, especially as his diet was naturally rich in nitrogen. The chlorides insufficiency is due to privation in his diet. His glucose had fallen to less than a third in the twenty-four hours (3.10 grams).

This is a good example of glycosuria, neurasthenia, obesity, and visceral goutiness—four forms of toxæmia with some hypertension, all cleared up in a cure of less than three weeks at Vittel.

CASE VI.

Mr. T., aged 22. Blood pressure 145 mm.; capillary reflux 4; pulse 68; weight 64.100 kilos. An otherwise healthy young university man, has suffered from intense seborrhoea capitis for sixteen years, and for a long time a lichenoid growth extending out on the groins and some inches down the thighs and on to the buttocks. He has usually a very dry skin, excellent digestion, is a moderate eater, temperate, hardly smokes, and has his bowels regular.

CASE VI.—Mr. T. August 23rd, 1910: Specific gravity 1029. Traces of albumen and glucose. True biliary pigments sensible and traces of the modified, also traces of indican. Oxalate of lime in great abundance, but small. Uric acid crystals. Purins 0.352. V, Volume; S, solids; A, acidity; U, urea; UA, uric acid; C, chlorides; P.A., phosphoric acid.

The urine analysis shows a marked disturbed ratio urea to uric acid, intense oxaluria, traces of albumen and sugar, some biliary pigments, and traces of indican.

He was ordered Pelciba brilliantine for the head and Pelciba antiseptic nearly pure on the skin lesions. At the end of about ten days, when he was called away, both the scalp and the groins were nearly well, and later a letter from him says that he was practically cured excepting for some brown stains on the site of the lichenoid eruption. He had continued the

treatment by drinking Vittel water at home. A year later reports perfect health.

I might continue to cite a large number of other similar examples, or some almost miraculous cures, but these latter are always open to the accusation of *post hoc propter hoc*. What, however, is interesting is that a not inconsiderable number of cases drift here independent of medical advice and often contrary to it, and get better. Another section is formed by those sent by their medical advisers as a last resource in diagnostic and therapeutic despair. In nine-tenths of such cases a sentiment of gratitude and respect is engendered towards their medical advisers, which clinches the tie between patient and physician for the future.

REFERENCE.

¹ BRITISH MEDICAL JOURNAL, 1910, ii, p. 190.

An Address

ON

IODINE AS THE SOLE DRESSING FOR OPERATION WOUNDS.

DELIVERED AT A MEETING OF THE STAFFORDSHIRE BRANCH OF THE BRITISH MEDICAL ASSOCIATION,

BY

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MEDICAL opinion concerning the utility of iodine as an agent in the production of asepsis has oscillated between contemptuous neglect and unqualified praise. At the present time its virtues are recognized on every hand, and its exceptional usefulness as a skin sterilizant needs no further emphasis, but reliance on its extended efficacy as the sole dressing to be applied to the operation wound from the date of the operation to the discharge of the case, is, I venture to think, a new departure.

This paper is based on the successful results of 31 cases treated by such a method, which, shorn of details, may be summed up as the treatment of the operation area by tincture of iodine, applied at intervals for the first few days, the incision being left exposed to the air, and only covered by the patient's night clothes.

My acquaintance with the use of iodine as the sole dressing for operation wounds dates back to thirty years ago, when I first remember seeing the practice of my father, who, besides being a hospital surgeon, was also public vaccinator, and it is vividly impressed on my mind that when the children came to have their arms inspected on the week following the vaccination, each arm which showed any signs of redness was painted over with a strong solution of iodine, and simply allowed to dry. This was invariably successful in preventing any spread of the cellulitis.

The first time I noticed iodine being used for the preparation and preservation of catgut was in America in 1907, whilst I saw it used for the sterilization of the skin of the abdomen in the gynaecological clinic in Vienna in 1908, and this method I adopted on my return.

Last year, immediately after my visit to the Annual Meeting of the British Medical Association in Birmingham to hear the discussion on the technique of wound treatment, it occurred to me, Why use dressings except iodine to operation wounds, and what is their use? and the more I thought of it the less reason I could see for them in suitable cases, on which account I at once proceeded to put the idea into practice, and I think that my results have fairly justified their absence.

Looking through the literature relating to the sterilization of the skin, I have been struck with the fact that special stress is laid upon the difficulty experienced in rendering the deeper layers of the skin sterile, and especially with the fact that any moisture of the skin means the detection of bacteria, where previously they were absent, if attempts had previously been made to discover them on a dry skin.

Although this stress is laid upon the action of moisture in macerating the epidermis and letting free the various micro-organisms, in no case does one find any special attention paid to the hair follicles, sweat and sebaceous

glands, as possibly being the most important home of these microbes. Norman Walker, in his book on dermatology, says:

While the sebaceous gland opens with a distinct mouth, either on the surface or into a hair follicle, the sweat duct terminates in the germinal layer. From this point a channel may be traced between the cells of the epidermis, where the sweat communicates freely with the interepithelial lymph, and the duct appears in the well-known corkscrew form in the horny layer.

These so-called sweat or coil glands, according to Unna, are not only concerned with the excretion of a watery fluid, but also in the lumina is a considerable amount of fat; and the fact that the palm of the hand, where, if anywhere, perfect lubrication of the skin is required, contains no other glands but the coil glands is a strong piece of clinical evidence bearing on the character of their excretion.

That these sweat glands play an important part in giving a resting place for these microbes probably explains the difficulty experienced in sterilizing the hands, as the palm of the hand contains no other glands except these sweat glands winding intricately through the epidermis.

What Mr. Leedham-Green tells us about the position of the microbes on the skin is also of interest. He says that we may expect to find them wherever fine molecular dirt can penetrate, but not deeper than that, and that we meet them not only on the surface of the cuticle, but between the cells of the superficial layers of the epidermis and in the entrance to the sweat glands, sebaceous ducts, and hair follicles. Haegler says that they do not penetrate deeply anywhere, either between the cells or in the sweat and sebaceous ducts. Further, Mr. Leedham-Green observes that hands with a soft, smooth skin and short, well-kept nails were cleaned with far greater ease than where the skin was rough or covered with coarse hairs and large sebaceous follicles.

From this it seems to me a very fair inference that the most important part played in infection is the sweat glands, and this is especially borne out by the fact that it is difficult to discover micro-organisms on a dry hand, whilst the more the hands are moistened by washing the more infected do the hands become; from this it is reasonable to assume that the more a part sweats the more micro-organisms are brought to the surface.

As the skin is dotted over with innumerable little holes it is not presumptuous to think that the microbes would more deeply penetrate between the layers of the skin by means of these channels, which offer little or no resistance, rather than through the more difficult path, namely, our first line of defence, the epithelial layers of the skin.

It was from a consideration of these points that I was first inclined to adopt the method of open treatment of wounds by simply painting them over with a solution of tincture of iodine.

In the North Staffordshire Infirmary we have two preparations of iodine in use—the one for ligatures consists of 1 part of B. P. tincture with 15 parts of 60 per cent. alcohol, and the other for application to the skin and wounds consists of 2 per cent. of iodine with 90 per cent. industrial methylated spirit.

This industrial methylated spirit has been used for some little time, and has proved perfectly satisfactory, and from a hospital economical point of view it is of great advantage, as it costs only 2s. a gallon as compared with the 26s. a gallon paid for rectified spirit. It contains only 5 per cent. of impurities in the form of wood-naphtha, as compared with the 10 to 15 per cent. of impurities in ordinary methylated spirit. It also has the great advantage that it does not cause any smarting of the eyes or other unpleasant effects.

The effect of the application of iodine to the skin is, first of all, destruction of the microbes of the surface, and, for a very short distance, by its penetrative powers, of those embedded in the very superficial layers of the skin. Probably as equally important an effect is the locking-up of the micro-organisms in the sweat glands by its hardening action on the skin and the simultaneous contraction of the mouths of the glands.

Haegler noted that the microbes do not penetrate deeply anywhere, either between the cells, or in the sweat or sebaceous glands, but I would suggest (and it is on this

suggestion that I base my treatment) that their penetration is deeper in the sweat glands than in the layers of the skin.

Mr. Leedham-Green has proved by experiments that the hardening of the skin, when produced by iodine, is gradually lost in the presence of blood or albuminous fluid.

In the same way if one paints iodine on the palm of the hand where sweat is abundant, and covers it up with a dressing, the hand soon has a softer appearance than normal, showing that the water and lubricating fat of the sweat has the same destructive effect on the skin hardened by the iodine.

Mr. J. M. Graham has shown that iodine penetrates more deeply into the pores of the skin when there has been no preliminary washing, and the freer the skin is from moisture and grease, the more efficient is the action of the iodine.

Objection to the use of iodine has been made on the ground that it causes eczema in children and old people, but the usual experience is that it only causes this phenomenon when the iodine dressing has been covered with gauze or wool, and not when left exposed to the atmosphere, unless it is applied very frequently.

Asepticity of the skin is probably impossible of attainment, but it is quite possible to inhibit the growth of bacteria until the wound itself has become sufficiently resistant.

When I thought of the great part which the sweat glands, in my opinion, played in the infection of a wound, I felt that, on theoretical grounds, there was a very great objection to dressings in any form, for, if a patient has the least tendency to sweat, the most likely place for it to happen is on that part of the body which is covered with gauze, wool, and a well-supporting bandage, for here are set free the microbes which have not been destroyed, but only locked up for a short period in these skin-penetrating sweat glands. Accepting this, it naturally follows that a sterile dressing with moisture from the sweat glands, plus albuminous fluid in the serum oozing from the wound, may be regarded as a very good medium for the growth of bacteria, and therefore one is forced to the conclusion that an aseptic dressing is harmful, and that if any dressing is used at all it should be one containing an antiseptic to inhibit this bacterial growth.

Our aim in the treatment of a wound is to let it be hermetically sealed against the entrance of outside organisms by its own dried secreted serum, and then to render this sterile to growth of the bacteria, if they should escape from the infected sweat glands.

It has been frequently observed that a rise of temperature takes place on the second day after operation—sometimes called a traumatic rise of temperature. The wound is then often dressed, and swabbed over with an antiseptic, and the temperature falls to normal. On the sweat infection theory, the microbes have come from the glands or from infection by the surgeon, though of course in these days we should be able to exclude him, with his gloves, mask, and head covering.

If a wound is observed two days after operation, it is often seen to have raised and slightly inflamed edges, but, with an iodine dressing, the wound is seen to be flat with the surface, and no surrounding swelling or redness.

There is a great probability that tincture of iodine owes a great part of its therapeutic action to the hyperaemia it induces—like the Bier treatment—causing a phagocytosis or intracellular destruction of micro-organisms in the neighbourhood of the wound, as seen in cellulitis, erysipelas, etc., and also on account of the increased flow of blood to the part, causing a more rapid union of the cut edges.

The preparation of the patient in a set operation is carried out as follows: A bath is given on the night preceding the operation, and clean clothes are put on; in the morning the operation area is dry shaved, rubbed over with ether, and painted over with the solution of iodine; when this was dry, a sterile towel was laid on the skin in the first series of cases, but now this has been abandoned as unnecessary. The area is again painted over when the patient is on the table.

In emergency cases there is no preliminary washing, which would not only macerate the epidermis, but also open the pores of the skin; therefore the area is only

dry-shaved, rubbed over with ether, and iodine painted on, which serves to kill the bacteria on the surface and lock up the rest.

The following precautions are considered essential for success: Perfect asepsis is to be observed during the operation. All bleeding points are to be stopped, and the wound rendered quite dry. All abdominal and deep wounds are to be sewn up in layers; peritoneum, muscle fibres, sheaths, and skin to be united separately to give the necessary support. Care is to be especially taken in skin apposition.

No wet swabs are to be used, in order that the skin may be kept dry, and only that blood is to be cleared away which adheres either to a plain dry swab or is removed by the iodine-containing swab when applying it to the stitched-up wound.

Iodine is to be applied immediately after operation, and again three hours afterwards, to render sterile any serum or blood which may possibly have oozed out.

The wound is again painted over daily for the next three days only, except in cases involving wounds about the perineum or vulva, to which I shall refer later.

The patient is to be watched until completely recovered from the anaesthetic, and the hands are to be kept outside the bedclothes to see that there is no unconscious interference with the possibly irritating wound.

Sisters in charge of the cases say that it is quite remarkable that in none of the cases have the patients touched their wounds, either awake or asleep, and the chief objection is that they like to show their incisions to the visitors. Special mention is made of this, because it is the first criticism that will probably be made of the treatment, and whether the observations of the sisters be taken into consideration or not, all I can state is that if the patient has rubbed, or even scratched, his itching wound, no harm has resulted.

In the first series of cases, the custom was to lay a sterilized towel loosely on the wound after it had been painted, and before being sent out of the theatre, but now that has been discarded as unnecessary, and the patient's clean clothes are simply pulled into position.

In the first six cases the iodine was painted once a day on the wound for six days; but in a case of inguinal hernia there was a slight iodine rash, and so now it is only painted on for the first three days, and again on the removal of the stitches on the ninth day.

There are a few points in regard to the after-treatment in certain cases which it may be as well to mention.

In all abdominal cases and herniae it is customary to give a hypodermic injection of $\frac{1}{4}$ grain of morphine and $\frac{1}{160}$ grain of atropine, immediately after the operation to prevent vomiting.

In operations about the vulva, as in the removal of cysts, etc., and in perineorrhaphy, the legs are tied to the corners of the bed, to keep them wide apart, and prevent as much as possible any sweating, as the sweat glands in this region are so numerous; in addition, the wound is painted over with iodine every time after urine has been passed.

The method is, of course, only applicable to those cases in which the wound can be completely closed up, and can in no case be used where a drain of any kind is necessary. In all operations where support is afterwards necessary, it cannot be used, as in amputations, excisions, etc.

In abdominal operations the method has been perfectly successful, but if the abdomen has been opened, either by the gridiron incision or the incision in the course of the rectus, the wound has been stitched up in separate layers, and any strain of the muscles only tends to approximate the fibres and sheaths.

In some forms of umbilical and ventral herniae, where there is no muscular support, some kind of binder, such as a sterilized towel, might be necessary until all danger of vomiting had passed, when the part would be freshly painted with iodine.

In inguinal hernia no kind of support is needed, whether one is content with tying off the sac very high up, or whether the canal is opened and reunited, because, as pointed out by Moynihan, the muscles forming the walls of the canal are so arranged that in their contraction they act as inguinal sphincters.

Patients have the further advantage that they do not have the feeling of being trussed up, nor have they to learn to breathe without any movement of the abdomen,

and this freedom appears to add very much to their comfort.

All the cases treated by this method have given excellent results, not even a stitch abscess having been observed.

I feel that this is a somewhat revolutionary practice in the treatment of wounds, after being used to the elaborate mass of sterilized gauze, wool, and Gamgee tissue which one has been in the habit of applying, and amongst my immediate friends the method was at first received very sceptically, dire consequences being prophesied. I am pleased to say that it is now being adopted by some of my colleagues with the same encouraging results.

In the annual reports of hospitals it is quite usual to draw attention to the increased cost of dressings, and if the method stands on no higher ground than that of economy, it will still serve some good purpose.

Up to date there are 31 cases, and, as the accompanying table is fairly explanatory, there is very little for me to comment on except to say that it shows that the method has a very wide field for application.

I should like to take this opportunity of tendering my thanks to my house-surgeon, Mr. Gilmore, for the great interest he has taken in the treatment, and also for compiling the table.

List of Cases Operated Upon to Date.

Name.	Age.	Date of Operation.	Case.	Iodine Treatment.	Discharged.
A. C.	44	Aug. 3	Perineorrhaphy	Iodine after micturition	Aug. 19.
W. D.	22	Aug. 9	Left varicocele	Daily 6 days	Aug. 22.
A. S.	25	Aug. 9	Right inguinal hernia	" "	Aug. 26.
A. P.	20	Aug. 9	Appendicitis	Daily; iodine rash	Aug. 26.
N. B.	35	Aug. 12	Papilloma of vulva	After micturition	Aug. 28.
N. E.	34	Aug. 12	Ruptured perineum	After micturition	Sept. 4.
H. T.	18	Aug. 16	Varicocele	Daily	Aug. 30.
G. A.	56	Aug. 18	Abdominal exploration	"	Aug. 30.
A. C.	18	Sept. 1	Left inguinal hernia	"	Sept. 16.
A. S.	39	Sept. 1	Carcinoma meso-colon	"	Sept. 17.
J. T.	48	Sept. 1	Strangulated right inguinal	Iodine 3 days	Sept. 17.
E. F.	17	Sept. 6	Right inguinal hernia	" "	Sept. 14.
J. E.	33	Sept. 6	Haemorrhoids	Iodine 4 days	Sept. 14.
J. P.	10	Sept. 18	Acute gangrenous appendix	Iodine 3 days	Oct. 2.
H. R.	68	Sept. 18	Strangulated inguinal hernia	" "	Oct. 7.
A. P.	29	Sept. 21	Left inguinal hernia	" "	Oct. 18.
S. L.	72	Sept. 21	Dermoid of ovary	" "	Oct. 10.
J. T.	24	Sept. 23	Ruptured perineum	Iodine 5 days	Oct. 12.
A. F.	45	Sept. 23	Lipoma of back	Iodine 3 days	Oct. 4.
A. W.	23	Oct. 11	Appendicitis	" "	Oct. 28.
A. F.	35	Oct. 12	Ventrifixation of uterus	Iodine 4 days	Nov. 2.
J. H.	59	Oct. 12	Right hydrocele	Iodine 3 days	Oct. 27.
W. M.	63	Oct. 25	Right inguinal hernia	" "	Nov. 9.
D. M.	33	Nov. 3	Fibromyoma of uterus	" "	In hospital.
J. B.	46	Nov. 3	Strangulated femoral hernia	" "	Died Nov. 5.
E. W.	31	Nov. 4	Varicose veins	" "	Nov. 22.
G. C.	30	Nov. 4	Left inguinal hernia	" "	Nov. 20.
R. C.	38	Nov. 4	Left inguinal hernia	" "	Nov. 22.
A. T.	20	Nov. 15	Twisted dermoid of ovary	" "	Nov. 20.
H. C.	32	Nov. 16	Papillomatous ovarian cyst	" "	In hospital.
E. L.	67	Nov. 16	Complete procidentia with vesical calculi, transperitoneal cystotomy. 54 calculi removed. Ventrifixation of uterus	" "	In hospital.

THE German Surgical Society will hold its forty-first annual congress at Berlin in April (10th-13th) under the presidency of Professor Garré, of Bonn.