

THE TREATMENT OF DERMATITIS VENENATA (RHUS) BY CRYOTHERAPY

(PRELIMINARY REPORT)¹

MURRY M. ROBINSON, M.D.

Washington, D. C.

It is common knowledge that dermatitis venenata, caused by contact with plants of the *Rhus* family, is a self-limited disease. The course of this disease, however may be extremely stormy and, in severe cases, quite prolonged. In the spring, summer and early fall, this plant is responsible for considerable loss of man-power in all fields of endeavor and therefore presents a problem in prevention and therapy. Any method of treatment which will shorten the course of this disease will be an important economic factor and will contribute a great deal to the physical comfort and well-being of the victims. Ordinarily, the disease comes on quickly and runs its course without complications for from one to three weeks, but in some cases, by the development of new areas which run a similar course, recovery is delayed for several additional weeks. During this time the patient will apply soaks, paints, lotions, and salves, and will probably be injected with *Rhus* extract. The method of treatment described in this report cuts the duration of the disease to a maximum of 7 days, with relief of symptoms after the first or second day. In addition, with this method new areas rarely occur, further simplifying the management of this disease.

Investigation into this mode of treatment was suggested to me by a physical chemist who at one time worked with liquid air. His laboratory was located in a part of the country where *Rhus toxicodendron* was plentiful. "Workers in the laboratory," he said, "could cure poison ivy by swabbing the affected areas with a cotton sponge soaked in liquid air."

The first patient whom I treated with liquid air was a white female, 24 years old. Her buttocks, the posterior surfaces of her thighs, flanks, and extensor surfaces of her arms and forearms were practically covered with large vesicles and bullae. She was very uncomfortable, could not walk, and could lie only on her abdomen, which was free of lesions. She was unable to sleep unless she took large doses of barbiturates. Since she had already been treated for three days with potassium permanganate baths, lotions, and injections of *Rhus* extract, without improvement, she was hospitalized and the involved areas were treated with liquid air. The next morning the treated areas were covered with yellow granular crusts of coagulated blister fluid. About half of the vesicles and bullae had ruptured. The patient's pruritis and burning had almost disappeared and she was able to sleep without the aid of sedatives. Two additional treatments were given at 24 hour intervals. On the second day she was able to sleep on her back, and on the fourth day nothing but remnants of vesicles re-

Received for publication October 3, 1946.

mained. The disease was then considered cured, and the patient was discharged from the hospital.

The method of treatment was as follows: a large cotton swab was dipped into the container of liquid air and the surplus liquid allowed to drain off, then the swab was rubbed quickly over the affected areas, just slowly enough to produce faint frosting of the skin. This method, as simple as it is, has serious drawbacks. Liquid air is impractical to use in private practice because it is difficult to obtain and store. In order to put this therapeutic method on a more routine basis, some other substance which could give the same results but which could be used with greater facility would have to be found. Two other substances which could produce frosting of the skin were available, solid carbon dioxide and ethyl chloride spray.

Carbon dioxide was the next substance tried. It was ground in a mortar to a fine powder and mixed with ether to produce a slush. This was then painted on the affected parts with a small camel's-hair brush. Large bullae appeared at the treatment site which soon ruptured and healed, resulting, incidentally, in the healing of the lesions of the dermatitis venenata. This substance was not quite as effective as liquid air and its action was a little more difficult to control, so it was discarded. Ethyl chloride was easier to handle, obtain and store, and seemed to produce equally good results without untoward side effects. It was sprayed on the involved areas, in the same manner in which it is used for local anesthesia, until the skin began to frost, and then continued for an additional few seconds until the sprayed area was a little hard to the touch. The spraying was repeated at 24 hour intervals. A case was considered cured when all of the vesicles had ruptured, the vesicular fluid had been absorbed, no oozing was present, and the affected area was dry.

That this method was useful, practical, and successful soon became apparent. Severe cases which would ordinarily run a course of several weeks, were aborted and cured in several days. It was possible in one or two days to clear up a mild isolated patch of this dermatitis.

Twenty four hours after spraying the vesicular lesions one noted that the area which was sprayed had become intensely red, some of the vesicles ruptured and their contents became congealed, other vesicles were absorbed. No attempt was made at any time to remove the crusts or the remains of the vesicles. As the skin healed, the crust and scales gradually fell off. After three or four sprayings, the lesions looked almost as bad as they did at first because of the crusts, but healing was definitely under way and was complete in a few days. The spraying itself is relatively painless. The first sensation is that of cold which changes to burning and then the area becomes numb. In general, patients find the method soothing since it decreases or stops the itching.

Only one precaution is necessary: care should be taken in spraying ethyl chloride on lesions of the face because of its general anesthetic effect. In spite of precautions, one patient whose face lesions were treated with this substance was promptly anesthetised. This danger was circumvented by applying a nasal clamp and having the patient breath through rubber tubing about two

feet long. With this method one must stop at intervals to permit the patient to breath in a normal manner, since the tube builds up carbon dioxide.

The manner in which this method of treatment achieves its results may possibly be mechanical or physiological. It is possible, for instance, that freezing causes the blister fluid on the treated area to expand with subsequent rupture of the vesicle roof and discharge of the vesicular contents. As evidence for this "mechanical" explanation, it has been noted that within 24 hours following the first spraying, dried and crusted serum is frequently seen over the sprayed areas, indicating that some vesicles, at any rate, have been ruptured by the process. Perhaps it is the mechanical rupturing of the vesicles which causes a rapid regression of the lesion. However, this must be only part of the action of the ethyl chloride, since not all of the vesicles rupture, while the vesicular fluid does disappear.

On the physiologic side, one must take into consideration that freezing a part will of necessity cause ischemia. The microscopic picture of dermatitis venenata usually demonstrates vesicles filled with clear fluid, and blood and lymph vessels dilated. The freezing may temporarily produce a contraction of these dilated vessels. If that is true, no more fluid will be poured out into the tissues, the existing fluid will be absorbed, and healing will begin to take place. The most likely possibility however, is that a combination of the two actions takes place. The freezing produces the ischemia of the affected area and causes a rupture of the vesicular wall with discharge of its contents. Sulzberger and Katz (10) and Pratt and Corson (8) were able to show that the vesicular fluid of dermatitis venenata caused by poison ivy was not under ordinary conditions capable of causing new lesions on the victim or persons who came in contact with it.

When I first used liquid air, I thought that perhaps it worked by oxidation. But when other oxidizing substances such as potassium permanganate, zinc peroxide, and hydrogen peroxide were substituted, the results were not the same as with liquid air. On the other hand, neither carbon dioxide nor ethyl chloride are oxidizing agents, yet both substances produce good results.

Up to the time of writing 101 cases have been treated. One of these was treated with liquid air, four with solid carbon dioxide, and ninety-six by spraying with ethyl chloride. No attempt was made to select cases according to severity or duration of the disease, except that only those cases in which the eruption was in the vesicular stage or in the early papular stage were treated. The cases in this series varied in severity from an isolated patch of vesicles on the arm or leg to the severe generalized form which was accompanied by fever. So far, there have been five which have not responded well to treatment.* Occasionally, where the bullae were extremely large, recovery was delayed for as much as a week, but in the majority, the average duration of the

* These five cases developed secondary infection underneath the crusts. One case was severe enough to need treatment with sulphones. There were 12 additional cases which did not complete the course of treatment. They were lost from observation after one or two sprayings.

disease was five days, and the average number of treatments was three, at 24-hour intervals. The extremely mild cases were often cured with one or two sprayings. However, several of the very severe cases, which one would expect to be difficult, responded as quickly as did the mild ones. The most resistant cases were those which presented large bullae. If the bullae which were larger than a large pea were punctured, cure was hastened. If they were not punctured, the surrounding areas cleared and the large bullae containing soft clumps of coagulated fluid remained.

This method of treatment is not specific for poison ivy. It can be used for other diseases. Bogard, (1) in 1943 noted that he could obtain almost immediate relief from itching, and quick regression of the vesicular lesions of dermatophytosis by spraying the lesions with ethyl chloride. After spraying, the affected areas dried and exfoliated. He claimed the cure to be permanent. Lewis and Morginson (6) taking cognizance of Bogard's report repeated the experiment. They obtained equally good results in all their cases. The superficial vesicles and pustules receded in several days. They, however, differed with Bogard in that practically all of their cases showed a recurrence of lesions within ten days.

Frey, (2) and Frey and Goll, (3) in 1937 reported good results, including quick antipruritic effect, from the use of Ekzemyl (9) in fungous diseases, in many forms of chronic eczema (except seborrheic and impetiginized eczemas) in dermatitis, pyodermas of infants, and, temporarily in psoriasis. The formula of Ekzemyl is:

Liquor lithantraeicis saponatus	10%
Resoreinol	1%
Adipis	1.5%
Ethyl chloride	87.5%

Meller and Tschofen (7) in 1938 found that ethyl chloride had no effect on fungous diseases.

In the past three months I have used this drug in the treatment of other dermatoses. The most promising results were obtained in those dermatoses composed of vesicular lesions. Herpes simplex responded extremely well after one or two sprayings. The pain and drawing sensations in herpes zoster was alleviated in one or two sprayings. After that, it ran the same course as dermatitis venenata. I obtained the same results in epidermophytosis as Lewis and Morginson, including the recurrence of lesions in about ten days. In addition, I treated some cases of contact dermatitis, caused by contact with other than plant substances, and obtained parallel results. The number of cases of vesicular dermatoses other than Rhus dermatitis was not sufficient to include in this preliminary report.

CONCLUSION

The use of refrigerants in the treatment of dermatitis venenata gives excellent results. Of three substances used, ethyl chloride was found to be most efficient.

Liquid air produces faster results, but the handling of this substance is so difficult that its substitution for ethyl chloride is not warranted. The latter method of treatment is rapid and simple. In addition, no contraindications to its use have appeared in the cases of this series.

Results so far seem to indicate that this method of treatment may have a diversified use in vesicular dermatoses. There is no bactericidal effect so it is not surprising that lesions such as those of epidermophytoses recur. However, in vesicular dermatoses where the causative agent is not constantly or repeatedly present one can expect that the vesicles will dry up, the areas exfoliate and that the skin will heal in a relatively short time.

REFERENCES

1. BOGARD, N.: Treatment of tinea with ethyl chloride. Arch. Dermat. and Syph., **48**: 511 (Nov.) 1943.
2. FREY, L.: Ekzemyl bei kindlichen Hauterkrankungen. Med. Klin., **33**: 129-131 (Jan.) 1937.
3. FREY, L., AND GOLL, H.: Über weitere Erfahrungen mit "Ekzemyl" bei kindlichen Hauterkrankungen. Arch. f. Kinderh., **112**: 72-81, 1937.
4. GREENBERG, S., AND MALOZZI, E.: Experiments in poison ivy sensitivity: effects of specific injections on the level of sensitivity to quantitative patch tests and on clinical susceptibility. Arch. Dermat. and Syph., **42**: 290, 1940; Correction *ibid.*, p. 542.
5. LEHDORFF, H.: Zur Behandlung des Lichen ruber planus mit Chlorathyl. Ars Medici, **16**: 438-1938.
6. LEWIS, J. H., AND MORGINSON, W. J.: Treatment of trichophytosis with ethyl chloride. Arch. Dermat. and Syph., **50**: 243-244 (Oct.) 1944.
7. MELLER, J., AND TSCHFEN, K.: Zur Behandlung der Psoriasis mit Cherathyl. Wien. klin. Wehnschr., **51**: 559-560 (May) 1938.
8. PRATT, A. G., AND CORSON, E. F.: Spread of dermatitis venenata by vesicle contents. Arch. Dermat. and Syph., **51**: 316 (May) 1945.
9. RUEGENBERG, W.: Eine neue Anwendung des Teers in der Dermatologie (Ekzemyl). Med. Welt, **9**: 648 (May) 1935.
10. SULZBERGER, M. B., AND KATZ, J. H.: The absence of skin irritants in the contents of vesicles. U. S. Nav. M. Bull., **41**: 1258-1262 (Sept.) 1943.