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A STUDY OF THE EFFECTS OF COMBUSTION PRODUCTS OF NATURAL GAS UPON PUBLIC HEALTH*

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In presenting this paper I shall avail myself largely of material collected through three main sources: (1) A review of the literature; (2) personal clinical investigations; (3) recent combustion products studies sponsored by the Resources Committee of the West Virginia University.

Since carbon monoxide ranks as the leading hazard among the products of combustion of natural gas and other fuels, the discussion will be limited to the consideration of this gas from the standpoint of a domestic and industrial health problem.

The immediate effect of carbon monoxide in producing acute asphyxiation and death is well known. It is the remote or residual effect occasionally following acute asphyxiation, and those cases of chronic states of ill health resulting from repeated and prolonged exposures that need to be especially emphasized. It was with the hope of establishing more definitely the role carbon monoxide plays in the causation of these delayed or chronic forms that led me to undertake a prolonged course of clinical investigation.

During these investigations 150 patients whose illness could be definitely traced to the effects of the gas were under observation. The incidence among residents in districts where natural gas is the chief source of fuel was found to be higher than among those residing in other districts, and

that the gas affected more individuals in the homes than in the industries. Thus, in the state of West Virginia 80 per cent of those affected by the gas were engaged in non-industrial pursuits, housewives and domestic employees predominating; whereas in Maryland where less gas is consumed for domestic purposes, only 36 per cent were non-industrial. Hence, properly to evaluate carbon monoxide as a health hazard the domestic problem as well as the industrial and the late or secondary manifestations as well as the acute must be considered.

Many investigations have been made with respect to carbon monoxide as an industrial hazard but no systematic clinical survey has been made with respect to the gas as a domestic problem. Fortunately, such a survey was made available through a special fund created for the purpose of studying the clinical aspects and by provision made for the study of the problem from an engineering standpoint. Both features were combined in the combustion product study sponsored by the West Virginia University and assisted by the West Virginia State Department of Health, the West Virginia Geological Survey, the Utilities Gas Companies of West Virginia, and Cities Service Oil Company of New York.

SCOPE OF CLINICAL SURVEY

Careful inquiry was made as to the age, sex, marital status and occupation of the residents of each domicile; the facilities for ventilation, the length of residence in gas-heated homes, the period of possible exposure and the number of hours exposed daily; the state of health of all occupants and the effect upon health incident to change of air, residence or season of the year was ascertained.

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CONDYLOMATA ACUMINATA

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There is very little in the recent literature concerning condylomata acuminata, although the lesions are still frequently seen in surgical, gynecologic, and obstetric clinics. The condition often complicates pregnancy, causing cesarean section to be performed for fear of puerperal sepsis. The primary purpose of this paper is to report experience with the use of podophyllin, which seems to be a specific for this condition.

ETIOLOGY

The specific cause of condylomata acuminata is not definitely known. The lesions were formerly considered positive proof of syphilis, but it is now known that they may be of either the syphilitic or the acuminate variety and that the two types may even occur in the same patient. The theories of cell inclusion resembling protozoa, of bacterial origin, and of transmission by contact have never been proved. The lesions usually appear in association with chronic irritating discharges, and it seems likely that such discharges, whether acid or alkaline and regardless of their source, may be the cause of the growths.

OCCURRENCE

The most common site of the lesions is between the labial folds, where the vaginal secretion collects and is less likely to be removed by cleansing; they are also found on the perineum, within the vagina, on the cervix, on the prepuce, and may also occur just at the edge of the anus or on the mucous membrane above the sphincter, usually in the first inch of the canal.

PATHOLOGY

Grossly, the growths bear at times a strong resemblance to a raspberry, a cauliflower, or a cockscomb. They are soft to the touch and are of a red, cyanotic hue. They begin as small, discrete, pointed papillae but later become confluent and

form growths of considerable size, especially during pregnancy. Usually they are about one to one and a half inches long; some are sessile, attached to the base, others are pedunculated and attached to other growths by the end point. When the papules are located on the mucous membranes they are constantly moist with a mucopurulent discharge; when they are on a cutaneous surface they are usually small, dry, and hard.

On section (Ravogli), "the specimen under low power shows a thick epidermis. The horny layer is thick and is easily detached from the other layers. The cells are not keratinized to form a strong protection. The mucous layer is thick, enlarged, made up of large epidermic cells of the prickly type. They do not show difference between the granular and the basal layer. The epidermis is adjusted on the elongated papillae, separating and covering each division of the papilla without causing any compression. The papillae, greatly enlarged, are divided at their ends into small thin sprigs. They are formed by connective tissue fibers, which are greatly increased in quantity and in size, infiltrated with small cells. Each growing papilla contains blood and lymph vessels. The capillaries which enter in the enlarged papillae have the caliber of cutaneous veins, and in some of the papillae the veins are dilated in the form of varicosities. Between the fibers forming the papillae there are lymph spaces which are filled with fibrin granules. Leukocytes and mast cells are found in the newly formed connective tissues. The proliferating process is remarkable. It can take large proportions, by the dichotomic scission of the end of the papillae through a chronic hyperplastic inflammatory process. The great enlargement of the blood vessels, the congestion, and the effused lymph between the tissues, is the cause of the swelling of the connective tissues and of the increase of the epidermic layers. It seems that the effusion of the lymphocytes between the connective tissue elements produces the proliferation and the increase of the growth. The papillae do not grow in one direction,

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but extend on all sides in the form of a fan. On account of the enlargement of the veins at the end of the growth, they take the appearance of a mushroom or of a pear. From this irregular process of side growths results the cauliflower appearance of the condylomatous mass."

DIAGNOSIS

The diagnosis is usually not difficult. *Condylomata acuminata* or genital warts must be differentiated from malignant growths and from those due to syphilis. The lesions due to syphilis are usually flat and broad, whereas those due to gonorrhea or to non-specific causes are pedunculated or sessile. Carcinoma, with which the condylomata may be confused, can be excluded by microscopic examination.

TREATMENT

Numerous methods of treatment have been advocated: Roentgen irradiation, radium irradiation, surgical excision, vulvectomy, ultra-violet irradiation, ointments and escharotics, and removal by cautery. None have been successful and recurrences have been the rule.

The treatment advocated here is simple. It consists of the application of 25 per cent podophyllin in mineral oil to all of the condylomatous masses, care being taken not to make the application too liberal. Within six to eight hours after the application, the patient begins to experience pain over the area of application and usually requires codeine sulfate or even morphine for relief. During the next twelve hours there is a marked local reaction, with inflammation and edema throughout the tissues near the site of application. On the second and third days the condylomata begin to slough off and the pain ceases. On the fourth or fifth day the tissues return to normal. No scarring is visible at the site of the condylomata or surrounding structures. A single application of the 25 per cent solution usually suffices. A weaker solution requires repeated applications and the pain is almost as severe.

In the present series of cases, twenty patients with *condylomata acuminata* and venereal warts were treated in this manner

and all were cured. Twelve were women, eight of whom were pregnant. The smears were negative for gonococci and the Wassermann reactions were also negative. There was one child who had an anal condyloma; in his case also the smears and Wassermann reaction were negative. There were seven males; four had smears which were positive for gonorrhea; none had syphilis.

The following are typical case reports from our series:

CASE NO. 1

Mrs. T. B., white female, aged 21, was admitted to the Obstetrical Clinic at Touro Infirmary when she was seven months' pregnant. Examination revealed one condyloma about one centimeter in diameter on the fourchette at the muco-cutaneous junction and two small condylomata between the labia minora and majora on both sides. Smears were negative for gonorrhea and the Wassermann reaction was also negative.

Twenty-five per cent podophyllin in mineral oil was applied. Eight hours later the patient began to complain of pain, and codeine was given for relief. Twelve hours later there was a marked reaction throughout the tissues of the perineum. On the fourth day the condylomata began to slough off and the pain disappeared. On the tenth day the perineal tissues were completely normal. The patient has had no recurrences.

CASE NO. 2

Mrs. R. M., white female, aged 17, was admitted to the ward when she was eight months' pregnant. Examination showed that the entire vagina was filled with condylomatous masses and that the lesions were also present on the vulva. The insertion of one finger into the vagina caused the patient to scream with pain. One week previously an attempt had been made to remove some of the condylomata with a cautery but they seemed to recur almost immediately after removal. The Wassermann reaction was negative and smears were negative for gonococci.

The vagina was swabbed with 25 per cent podophyllin in mineral oil on a cotton applicator and the lesions on the vulva were similarly treated. Twelve hours later the patient began to complain of pain and was given codeine sulfate for relief. Two days later another application of 25 per cent podophyllin was made. Two days after the second application the condylomata began to slough away. Twelve days later the vaginal mucosa was normal, the condylomata on the labia had also disappeared, and the patient could be examined without pain. One month later she was delivered normally.

CASE NO. 3

J. S., colored male, aged 4, was admitted to the Surgical Clinic at the Touro Infirmary. Examina-

tion revealed a condylomatous mass at the mucocutaneous border of the anus. Smears and Wassermann reaction were negative. The mother gave a history of a similar mass that had been removed surgically three weeks previously.

Twenty-five per cent podophyllin in mineral oil was applied. The patient experienced no pain although there was a slight reaction 24 hours later at the site of application. Seven days later the patient returned to the clinic and examination at that time showed that the condyloma had disappeared and all structures at the site of application were normal.

CASE NO. 4

S. R., white male, aged 16, was admitted to the clinic with venereal warts on the prepuce. Smears and Wassermann reaction were negative. A single application of 25 per cent podophyllin in oil caused all masses to disappear in six days.

SUMMARY

Although the exact etiology of condylomata acuminata remains unknown, an irritating discharge is the most common cause of the lesions.

The most frequent site of occurrence is the labia, the perineum, the vagina, the cervix, the prepuce, the edges of the anus, and, occasionally, the area just above the anal sphincter.

The growths are most common in young adults but may occur in infants.

Twenty cases of condylomata acuminata and venereal warts were treated with 25 per cent podophyllin in mineral oil and all were cured.

The pertinent data on four cases are recounted.

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THE USE OF ENTERIC-COATED PILLS IN ALLERGIC STATES*

A PRELIMINARY REPORT OF 82 CASES

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Although attempts to obtain specific desensitization in allergic states by oral therapy have for the most part been unsuccessful up to this time, reports indicate that the method is worthy of further study and trial. The possible advantages of this route are obvious: If it were successful, the patient would be spared the discomfort of injections and the inconvenience of frequent visits to his physician. He could continue therapy when visits to the physician were impossible. Finally, the antigen, if kept in a dry state, would remain active for long periods of time.

The chief difficulty in obtaining efficient hyposensitization by this method seems to lie in the fact that digestion alters the antigenic properties of products administered by the oral route, so that only a small and variable amount of unaltered antigen is absorbed. Touart¹ overcame this difficulty and prevented gastric digestion by administering pollen extracts in salol-coated pills, with satisfactory results. Although the salol coating does not prevent intestinal digestion of the pollen, recent experimental work² has furnished an explanation for his favorable results by the demonstration that gastric digestion has a much greater effect upon the antigenic power of ragweed pollen than is brought about by digestion by artificial pancreatic juice.

On the basis of these demonstrations, ragweed pollen, in enteric-coated pills, was administered to a group of patients, 82 in all, who were definitely allergic to ragweed and who had had hay fever or asthma or both during the pollinating season of the

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