A CASE OF THALLIUM POISONING FOLLOWING THE PROLONGED USE OF A DEPILATORY CREAM

WALLACE S. DUNCAN, M.D., AND EDWARD H. CROSBY, M.D.

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The Journal of the A. M. A. recently published an article[1] bringing to the attention of the medical profession the sale of a depilatory cream which was found to be particularly high in thallium acetate content. This article led to the correct diagnosis in the following case:

REPORT OF CASE

A white woman, aged 24, came to the Cleveland Clinic complaining of severe pain over the soles of both feet and ankles, weakness of both feet and legs, and intense burning of both feet, most marked in the third, fourth and fifth toes. She had been receiving treatment elsewhere for arthritis of both feet and ankles.

Four and one-half months prior to entering the clinic, the patient had first noticed intermittent epigastric pains which gradually increased in severity to sharp, cramplike pains throughout the entire abdomen. These pains were associated with nausea, several attacks of vomiting, loss of appetite and substernal pain, but were unrelated to the taking of food. Two months after the onset, the abdominal pain subsided and the patient first noticed burning and numbness of the third, fourth and fifth toes of both feet. The onset of this numbness and burning was insidious and at first was apparent only while the patient was bathing. As the numbness increased and the burning became intense and almost constant there developed an increased sensitivity of the skin over the soles of both feet, the outer three toes, the dorsum of the feet, and the anterior surfaces of the ankles and legs, extending to the knees. Weakness was then noticed in the third, fourth and fifth toes gradually extending to include the muscles of the calves and the thighs. During the three weeks preceding her examination at the clinic, these symptoms were so severe that the pressure of the bedclothes caused pain, and walking was almost impossible. Several dizzy spells were experienced and at times the vision was blurred. The patient had become very nervous, cried easily, had lost about 10 pounds (4.5 Kg.) and felt continually tired.

The past history revealed the following facts: The patient had used alcohol for a period of time, the amount, however, having been greatly reduced in the preceding year and a half; cigarets had been used somewhat in excess, from twenty-five to thirty in a day, and for several years she had used a henna rinse after washing her hair.

The family history revealed nothing relevant to the existing condition. The menstrual history was significant in that the last period had occurred seven weeks previous to examination.

Physical examination revealed undernourishment, apprehension and emotional instability. The temperature, pulse, respiration, and blood pressure were within normal limits. The hair was definitely henna-colored but firmly embedded. Hair was distributed normally over the body with the exception of the face, where the growth was more profuse than is normal and this hair was firmly embedded. The pupils were equal and reacted to light and in accommodation. Ophthalmoscopic examination showed that the fundi were entirely within normal limits. The ears and the nose were normal. The tonsils had been removed and no fragments remained. No pathologic condition was found that would account for the patient's dizziness. The tongue was heavily coated; it protruded in the midline and a fine tremor was present. The teeth were in good repair but there was infection of the gums, particularly about the lower incisors. The thyroid gland and the lymph glands showed no enlargement. The breasts were small and firm, and a small amount of colostrum could be expressed. The lungs and heart were normal. The abdomen was flat and symmetrical, and tenderness was present throughout on deep palpation. The pelvic examination showed the vaginal mucous membranes to be slightly blue in appearance, the cervix soft, the fundus enlarged posteriorly, and uterine arteries definitely palpable. The upper extremities were normal. The lower extremities were of equal length. There was obvious muscular atrophy of the thigh and calf group of muscles, which was slightly more marked on the left side. A moderate degree of bilateral drop foot was present associated with marked weakness with complete inability to move the three lateral toes on either lower extremity. Heat and cold were readily distinguished by the patient over all areas of the body. Touch and pain sense perceptions were markedly increased over the outer surface of each calf, the lateral surface of the feet including the third, fourth and fifth toes, and the soles of the feet. Touch and pain were less readily appreciated over the medial surface of each calf. All reflexes could be readily elicited. The knee jerks were hyperactive; the Babinski test was not elicited. No rombergism was present. Movement of the lower extremities was painful, probably because of increased skin and muscle sensitivity. There was no evidence of joint reaction apart from some thickening about the metatarsophalangeal joints. Heat could not be tolerated on either lower extremity. All the other joints were normal.

The urine was normal except for an occasional pus cell. The red blood cells numbered 3,875,000 per cubic millimeter, the white blood cells 10,750 per cubic millimeter, hemoglobin 78 per cent (Tallqvist), polymorphonuclear neutrophils 76 per cent, small lymphocytes 23 per cent, transitionals 1 per cent. The phenolsulphonphthalein return was within normal limits; blood calcium, sugar, and urea were within normal limits; the Wassermann reaction was negative. A blood smear stained with Wright's stain showed nothing abnormal. Flame and spectroscopic examination of a twenty-four hour specimen of urine showed the presence of a small amount of thallium.

The temperature about both feet, recorded with a skin thermometer, is given in the accompanying table. The normal temperature with this thermometer is from 32° to 33° C.

Temperature of the Toes

	Left Foot, Degrees Centigrade	*Right Foot, Degrees Centigrade*
First toe	34.8	34.4
Second toe	33.8	34.7
Third toe	35.0	35.9
Fourth toe	36.3	36.2
Fifth toe	37.8	35.9

Galvanic and faradic stimulation over the muscles of each lower extremity gave no response. Only with currents higher than normal could a response be obtained when the external popliteal and anterior tibial nerves were stimulated.

The patient was admitted to the Cleveland Clinic Hospital with a diagnosis of peripheral neuritis of obscure origin, associated with early pregnancy. After admission, it was discovered on further questioning of the patient that she had been using a depilatory cream, "Koremlu," nightly for the preceding five months, beginning its use two weeks before the appearance of the first symptoms. A quantity sufficient only to cover the upper lip and the chin had been used on each occasion. At each application the cream was well rubbed in.

Careful questioning revealed the fact that a henna hair rinse had been used every four months for the preceding five years. Henna is a harmless vegetable, but in the manufacture of hair dyes and washes either a salt of some one of the heavy metals or a coal tar product is added. Although these materials are toxic, it is scarcely

possible that the existing neuritis could be traced to the dye, which was used at such infrequent intervals. Alcohol had been used for the preceding six years but only in very moderate quantity during the preceding year and a half and the alcohol had been analyzed prior to its consumption. From twenty to twenty-five cigarets had been used daily over a period of months, but this obviously could not account for the condition. It was therefore concluded that the peripheral neuritis was most logically attributable to the toxic effects of thallium absorbed from the depilatory cream.

There was no doubt concerning the diagnosis of pregnancy and the question immediately arose as to the advisability of a therapeutic abortion. There were three excellent reasons why a therapeutic abortion should be induced:

1. In thallium poisoning the ductless glands are especially involved. Dixon[2] has produced cretinism experimentally in young animals by chronic poisoning with thallium, probably by its action on the thyroid gland.

2. In thallium poisoning the kidneys are temporarily damaged, producing albuminuria. Although the patient showed no kidney damage, the added burden of pregnancy increased the probability of interference with kidney function.

3. The mild toxicity associated with pregnancy would be an added hazard to the recovery from a condition in which the prognosis could not be definitely determined.

Following consultation, therefore, it was considered advisable to induce abortion and an attempt was made by the use of theelin and oxytocin in the following manner:

At 8 p.m. the patient was given 2 cc. (100 units) of theelin, subcutaneously. At 8 a.m. the following morning she was again given 2 cc. At noon she was given 3 cc.; at 4 p.m. she again received 3 cc. At 8 p.m. the dose was increased to 4 cc., and the following day she received four doses of 4 cc. each. The next morning at 8 o'clock she was given 4 cc. of theelin, and after that she was given oxytocin in four doses of 0.5 cc. each, at half hour intervals. She received a total of 34 cc. (1,700 units) of theelin and 2 cc. of oxytocin. No change was noted by rectum in the size of the external os, and no pains or abdominal discomfort were experienced by the patient. Twenty-four hours later the advisability of giving more oxytocin was considered, but owing to the fact that the urinary output was considerably reduced during these twenty-four hours, it was considered inadvisable to make any further attempt to induce abortion in this manner.

As the method described was found to be inadequate, a dilation and curettage was carried out following packing of the cervix and uterus, which had been done on the preceding day.

The patient was discharged from the hospital within a short period and since that time has shown definite improvement. She still suffers from very persistent burning in the feet, with weakness in the toes, which were affected at the time of her admission to hospital.

Comment

Thallium was discovered by Crookes in 1861 and investigated chemically by Lany in 1863. It was introduced into medicine about twenty years ago as a remedy for certain disorders of the skin. Thallium (atomic weight 204) belongs in the group with zinc, lead and tin. In its action it resembles potassium and arsenic rather than heavy metals and is an active poison, being slightly more toxic than arsenic and having a distinctly accumulative effect. Acute thallium poisoning is characterized by stimulation of the heart followed by depression, resulting in death from cardiac failure. Chronic thallium poisoning is characterized by injury of the endocrine glands, peripheral neuritis, and falling out of the hair even to complete alopecia. Very small doses fed to young animals cause stunted growth and symptoms of cretinism.

Thallium has been used in the treatment of syphilis, for the arrest of night sweats in phthisis, and in the treatment of cystitis. Its use, however, has been abandoned because of the toxic symptoms that it produces. Dermatologists use thallium in small doses to produce epilation in diseases of the scalp in children, and Davies and Andrews[3] showed that children up to 7 or 8 years of age withstand the action of thallium well. Older children and adults are more likely to show toxic symptoms. In one of their cases, arthritis and periarthritis of the knee joints were present.

In 1912, Sabouraud,[4] a French authority on diseases of the hair and scalp, devised an ointment of thallium acetate for use in the removal of superfluous hair. Since that time, accidents have been reported from its use. The original Sabouraud prescription called for an introduction into the ointment of not more than 1 per cent of thallium acetate and Sabouraud urged that even in this dosage it should be applied only once a day and that an amount of the ointment not larger than two kernels of wheat should be used. Ointments containing 1 per cent of thallium acetate should not be used over an extensive surface.

Dixon pointed out that thallium used experimentally in animals which had been shaved produced a rapid growth of hair. He also

reports that thallium salts exert no local action but when rubbed into the skin with oil or alcohol are rapidly absorbed and produce a systemic reaction, the effect being mainly on the autonomic motor system, which becomes more sensitive, so that electrical stimulation of the nerves produces an exaggerated response, even though the stimuli are below the normal response level.

Ormerod,[5] by postmortem analysis of body structures, showed that the muscles act as the main storehouse for thallium and that the excretion is mainly by the kidneys, but that thallium is also excreted in all the body secretions.

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