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THE TOXIC ACTION OF CHROMIC ACID USED AS A
CAUTERANT.

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versity, Philadelphia, and German Hospitals.*

presented by the author





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FOR many years I have been in the habit of employing chromic acid in preference to all other cauterants in obstinate cases of recurrent vegetations upon the genitals. These papillary outgrowths, although they have no truly specific character, and are not of necessity connected with any form of venereal disease, are yet extremely persistent, and frequently return after having been cauterized, or after having been burned even with such powerful cauterants as nitric acid, or glacial acetic acid, or the acid nitrate of mercury. Although often associated with urethral discharges, or with the various forms of venereal ulcer, they are simply manifestations of accompanying local irritation, and have no true dependence upon the specific poisons of these diseases. They are often found in young persons in whom there has been no possible venereal infection, and are frequently met with during pregnancy when the physiological congestion of the female genitals favors their development. Anatomically, they are merely papillary outgrowths occurring upon a basis of connective-tissue elements, and covered by an extensive mucous layer, the horny layer of the skin being frequently absent; for this reason they are usually covered with a moist and readily decomposable secretion, which is apt to become extremely offensive. They take their origin so deeply in the tissue of the derm that ordinary cauterants do not reach and destroy them. For this reason chromic acid has been for years in these cases the favorite application in the hands of many venereal specialists.

My attention was called during October last to the case of a young woman, an inmate of the venereal wards of the Philadelphia Hospital, who had a mass of vegetations of this character, covering the labia majora and the nymphæ, extending up towards the pubes and down towards the anus, and several inches in thickness. This had been variously treated and had constantly recurred. I had been interested in trying the simple treatment recommended by Dr. Peters, of Prague, consisting in the application of cold poultices, a method indorsed by Zeissl and by Bumstead, who mention cases in which very extensive vegetations disappeared under the simple use of water-dressings. The patient, an otherwise

healthy girl, was placed upon this treatment, which was continued for about two weeks, at the end of which time my resident reported to me that there had been absolutely no improvement. I then ordered the usual application of chromic acid solution, of the strength of one hundred grains to the ounce of water, directing him to protect the neighboring parts and to avoid using an excess of the acid. The application was made on the afternoon of the same day. The acid solution was applied by means of a tuft of absorbent cotton, about a half-ounce of the liquid being used. The vagina and anus were carefully protected by tampons of cotton soaked in carbolized oil. After coming from under the anæsthetic she complained of a burning pain referred to her vulva; this continued through the night, during which time she was restless, and frequently called for water. About 4 A.M. she rose to urinate, and fell; she was assisted to bed and slept until 7 A.M. She continued thirsty but not feverish, all the morning, complained of nausea, and refused her food. When next seen, at 3 P.M., she was pale, with cold extremities, rapid pulse, complained of pain in the left hypochondriac region, and expressed fear of approaching death. Temperature in axilla 99° . Although active treatment was instituted her condition did not improve, and she died at 6.30 P.M., 27 hours after the application of the acid. Intellection was preserved to the last.

A careful autopsy was made with the following results: *Body*, that of a well-nourished, medium-sized girl; marked post-mortem discoloration on the back of trunk and limbs. Small scar on left thigh. Mass of venereal warts at vaginal outlet, occupying both labia, and extending from anterior commissure to anus; dark in color and covered with an offensive discharge. *Thorax*.—Both lungs crepitant throughout; some hypostatic congestion posteriorly. The left lung adherent to the chest wall posteriorly, and to the diaphragm. Right lung free. Pericardium contained about two drachms of clear straw-colored fluid. *Heart*.—Right auricle filled with currant-jelly clot. Small, chicken-fat clot in left ventricle. Auriculo-ventricular and semilunar valves perfectly normal. *Abdomen*.—Stomach distended, mucous surface shows numerous fine ecchymoses, the result of vomiting. Section of duodenum shows biliary ducts patulous. Large intestine distended with gas, and containing fecal matter. Liver small, weight 40 oz.; on section shows the nutmeg change. Gall bladder distended, with a very dark-colored secretion. Spleen, flabby, pale, weight 5 oz. Kidneys the seat of passive congestion, small, weight 9 oz. Capsules strip off easily. *Vagina*.—Section of vagina shows mucous membrane dark-red in color, covered with a yellowish discharge, with no evidences of contact of acid. *Brain*.—Dura thin, non-adherent, longitudinal sinus contains post-mortem clot. Veins of pia mater swollen and congested. Puncta vasculosa large. Choroid plexus injected.

Portions of the various viscera were submitted to Dr. John Marshall for analysis, who reported as follows:—

“The kidney tissue and the liver tissue both contained chromium, most likely as sodium chromate—a substance poisonous in doses of from one to three grains. The tissue of the rectus muscle was free from chromium. The chromic acid was absorbed, and entered into combination with the sodium

of the sodium carbonate of the blood to form sodium chromate. This is the most probable explanation of what occurred."

As I was greatly surprised and annoyed at the sudden and fatal termination of this case, I at once carefully looked up the literature of the subject. The ordinary text-books upon venereal disease without exception mentioned chromic acid as one of the most active and efficient cauterants in these cases, but accompanied this statement with no word of caution other than as to its local effect. A similar remark may be made of the treatises upon therapeutics which mention its efficiency and its powerful local action, but record no cases of death from its use.

Dr. Lange¹ long ago warmly recommended the employment of this acid in these cases, and Dr. Busch² recommended it in a large variety of conditions in both dilute and concentrated solutions, and in full strength in carcinoma, lupus, and other malignant affections.

These authors quoted Mr. Marshall,³ of the University College Hospital, London, who still earlier had reported a series of cases of warts and other growths upon the genital organs treated by the application of chromic acid in the strength of one hundred grains to the ounce of water, and with the happiest results. In 1868, Mr. H. S. Purdon⁴ recorded his results upon a large variety of cases, including condylomata, using it in the strength of two drachms to the ounce of water. He recommended it strongly to the profession, and did not allude to any unpleasant consequences. M. Keller, even in advance of Mr. Marshall, had also strongly recommended the acid as an escharotic in all new growths, and especially in condylomata of the genital organs.

Fromer⁵ advises the employment of chromic acid on account of its continuous and thorough action, having used it both clinically and experimentally in a large number of cases. He quotes the experience of Keller who tried it in many cases as an escharotic in the wards and clinical service of Sigmund, but makes no mention of possible danger from its use. He does allude to the care which is requisite in employing the chromic acid on account of its great power of penetration, and says that for that reason the concentrated solution (saturated) is to be preferred.

M. Gubler⁶ remarks that chromic acid is one of the most powerful of caustics. He adds: "This caustic, applied over an extensive surface, may therefore give rise to a deep slough. Further, the absorption of chromic acid is not free from danger, and patients have been poisoned by a too extensive application to the surface of their bodies."

The United States Dispensatory says that, according to M. Gubler, patients have been poisoned through absorption by a too extensive application of the acid to the surface, but gives no details. In the "Archives für experimentelle Pathologie und Pharmakologie," Vol. 6, 1877, Dr. E. Gergens relates a num-

¹ Deutsche Klinik, vol. xii. 1860.

² Ibid. 1886, vol. xv.

³ The Lancet, January 24, 1857.

⁴ Journal of Cutaneous Medicine, vol. ii. p. 40.

⁵ Wiener Medicinische Wochenschrift, 1851, No. 8, page 119.

⁶ Gazette Médicale de Paris, and Bulletin de Therapeutique Médicale et Chirurgicale, 15th August, 1871.

ber of experimental observations upon rabbits, from which he concludes that chromic acid kills after absorption into the blood, which it enters in the form of a chromate, on account of a secondary decomposition in the kidneys. The chromic acid is set free by the contact of the salt with the acid urine, exerting its intensely irritative effects upon the renal epithelium, and producing the parenchymatous inflammation of that organ which Gergens invariably found. Dr. August Meyer¹ confirms these experiments, finding, in addition to the nephritis, congestion, ecchymoses, and even ulceration of the gastro-intestinal mucous membrane and the mucous membrane of the bladder. He also found evidences of chromic oxide in the liver, heart, blood, and kidneys. A few other unimportant and merely incidental references include all that I have been able to find in relation to this subject. As I had been using the acid for years in the same strength and by the same method, and both in hospital and private practice, without the occurrence of a single alarming symptom, I have never given much thought to the possibility of constitutional effects, still less to the chance of a fatal termination. I therefore desire to place the case on record, and to ask if similar cases have occurred in the practice of any of my fellow-members.²

¹ *Medicinishe Jahrbücher*, 1877.

² Since writing the above paper, which was read at the Meeting of the Association of Genito-Urinary Surgeons, held at Newport in June, I have received a courteous communication from Dr. Louis Jullien, calling my attention to the following paragraph contained in his "*Traité pratique des Maladies Veneriennes*, p. 1222, which had escaped my notice although I had looked over his book and carefully gone over the index.

"Chromic Acid employed by Marshall in 1857, and later by Key, Berkeley Hill, and others, is certainly very efficacious in a watery solution of 5:30. We advise, however, that it be employed only in cases where the neoplasm presents a small surface, as the absorption of a certain quantity of this substance is not without danger.

"Toxic symptoms such as obstinate vomiting, involuntary stools, fever, etc., have been observed. In one case where an enormous mass of vegetation had been treated with this substance a fatal result ensued."

Dr. Jullien adds in his note to me—"Votre observation est un appui nouveau à mon opinion, et à ce titre je dois vous féliciter et vous remercier tout particulièrement de ne l'avoir point passée sous silence, mais de lui avoir donné au contraire la plus grande publicité."

