

Surgery through time. Saturn extract: An 18th century medical prescription

La cirugía a través del tiempo. Extracto de Saturno: una receta médica del siglo XVIII

Lina A. Gómez^{1*}, Eduardo Tuta-Quintero², Ignacio Briceño-Balcázar³, Angélica García²,
Julio Martínez-Lozano³ and Alberto Gómez-Gutiérrez⁴

¹Biomedical Research Center (Cibus), Faculty of Medicine, Universidad de La Sabana, Chía; ²Faculty of Medicine, Universidad de La Sabana, Chía; ³Human Genetics Group, Faculty of Medicine, Universidad de La Sabana, Chía; ⁴Institute of Human Genetics, Faculty of Medicine, Pontificia Universidad Javeriana, Bogotá. Colombia

Abstract

Objective: To analyze a medical prescription from the 18th century in the New Kingdom of Granada, nowadays Colombia, used in the treatment of soft tissue injuries, specifically wounds and skin ulcers. **Method:** A documentary search was conducted in the Cipriano Rodríguez Santamaría Historical Archive of the Octavio Arizmendi Posada Library, at Universidad de La Sabana (Chía, Colombia), and a review of the literature available in electronic databases. **Results and conclusion:** The colonial medical prescription mentions the benefits of lead acetate in poultice for inflammatory processes in general and skin alterations. However, its use is not recommended due to its potential cytotoxic effect at tissue level in various organs.

Keywords: Lead acetate. General surgery. Wounds. Inflammation. New Kingdom of Granada. Medical prescriptions. Ulcer.

Resumen

Objetivo: Analizar una receta médica del siglo XVIII en el Nuevo Reino de Granada, hoy República de Colombia, utilizada para el tratamiento de las lesiones de tejidos blandos, específicamente heridas y úlceras en la piel. **Método:** Se realizó una búsqueda documental en el Archivo Histórico Cipriano Rodríguez Santamaría de la Biblioteca Octavio Arizmendi Posada, en la Universidad de La Sabana (Chía, Colombia), y se hizo una revisión de la literatura disponible en bases de datos electrónicas. **Resultados y conclusión:** En la receta médica colonial se mencionan los beneficios del uso de lo que se interpreta como acetato de plomo en cataplasma para procesos inflamatorios en general y alteraciones de la piel. Sin embargo, en la actualidad se conoce su potencial efecto citotóxico tisular en diversos órganos.

Palabras clave: Acetato de plomo. Cirugía general. Heridas. Inflamación. Nuevo Reino de Granada. Recetas médicas. Úlcera.

*Correspondence:

Lina A. Gómez
Autopista Norte km 7
C.P. 140013 Chía, Cundinamarca, Colombia
E-mail: Lina.gomez3@unisabana.edu.co

Date of reception: 10-07-2020
Date of acceptance: 15-09-2020
DOI: 10.24875/CIRUE.M20000230

Cir Cir (Eng). 2021;89(1):132-136
Contents available at PubMed
www.cirugiaycirujanos.com

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Introduction

In the Historical Archive of the Octavio Arizmendi Posada Library, at La Sabana University, located in the municipality of Chía, Cundinamarca department, at about 23 kilometers from Bogota (Colombia), there is a collection of more than one hundred medical recipes dating back to late 18th century. They correspond to a donation made by Father Cipriano Rodríguez Santa María, institutional eponym of the archive. This article transcribes and analyzes one of these formulas, used in those days as a treatment for wounds and skin ulcers. In addition, a search for the history of surgery focused on the management of these injuries was carried out.

Method

A documentary search was carried out at La Sabana University Octavio Arizmendi Posada Historical Library Archive, where the recipe *Acerca del extracto de Saturno* (About the Extract of Saturn) is found, and, subsequently, a review of available literature in the PubMed, SciELO and ClinicalKey databases for the period between 1997 and 2017 was conducted, using the search terms “*Acetato de plomo*” (Lead acetate), “*Vegeto*”, “*Heridas*” (Wounds), “*Úlceras*” (Ulcers) and “Thomas Goulard”.

Results

In the 5th century before the Christian Era, in the period comprised between 460 and 370 BC, Hippocrates introduced the concept of cause and effect in the relationship between patient and disease; in addition, he defined surgery as a specialty responsible for controlling hemorrhages, recognizing, and treating fractures, dislocations, anal fistulas and thoracic empyemas. The use of linen dressings soaked in wine to favor second intention wound healing, and implementation of aseptic practices was also described, thus generating a great impact on medicine and surgery of those days, with some of its principles currently being preserved¹⁻⁵. In the Middle Ages, the first hospitals appeared, among of which the best known were the Byzantine hospitals, where the ancestors of surgeons and nurses cared for patients with wounds using treatments based on the use of medicinal plants. Around this same Alexandrian era (until 642), the Jews, who had already designed their own

operating rooms, practiced wound healing by intervening their edges to achieve better healing. In the Italian Middle Ages, Hugo Borgognoni (c. 1170-1259), who applied wine on wounds, stood out^{2,3}.

The Edwin Smith Papyrus

This papyrus, which originated in Ancient Egypt, was discovered in 1862 by Edwin Smith (1822-1906) and dates back to 1600 BC, although it is believed to be a copy of a much older papyrus, perhaps from 3000 BC, and is considered to be the first book specialized in the treatment of wounds. It consists of 48 clinical cases that are presented according to the location of the injury and organized according to their severity. They contain the semiological description and diagnosis, in which whether the wound would be treated or not was established, and what treatment would be used, with the injury resolution being presented with a scientific, not magical, focus, and with complementary comments that supported the information contained in the document. One of the described treatments, which is preserved in current clinical practice, is the suture of wounds that subsequently were covered with bandages made of fine linen fabric. In general, this papyrus describes how wound dressings based on animal fat, cotton fibers and honey were applied. The Edwin Smith papyrus has great relevance in the history of medicine, since it clearly shows the change of method in clinical practice, with a rigorous and independent focus on explanations and supernatural approaches. According to the recommendations found in the Edwin Smith papyrus, probably without knowing it, non-adherent techniques, with antibacterial potential, which absorbed exudates, were used in those days⁴.

The extract of Saturn

In the mid-18th century, a book of recipes, written by French physician Thomas Goulard (1697-1784), was published, translated into Spanish with the title *El cirujano instruido* (The well-educated surgeon), in which the author relates his experience healing a variety of diseases with lead derivatives. The formula, called “Extract of Saturn”, was, according to Goulard, an inexpensive and easy method for curing almost any external complaint. Lead acetate or extract of Saturn was applied in the 18th century in general medicine and surgery, and “Goulard’s Water” was proclaimed

as an aqueous solution of lead acetate with alcohol that was used for the treatment of burns, bruises, rheumatic pains, hernias, inflammations and even herpes⁶.

Charles Richard de Beauregard (c. 1720- c. 1790), another French surgeon who settled in Madrid between 1759 and 1786, was professionally known for his dedication to the treatment of blenorrhagic urethritis using therapeutic methods based on lead acetate, a treatment that had already been used by Thomas Goulard. Blenorrhagic urethritis, stenotic phimosis and paraphimosis were prevalent in Spain in those days, and when Beauregard settled in Spain, Goulard's urological texts were not known in this country and Beauregard kept them secret, proclaiming himself as the inventor of the master formula. Subsequently, theology professor Vicente Ferrer Gorraiz Beaumont y Montesa (1718-1792) revealed Beauregard's "secrets"⁷.

Gorraiz acknowledged surgeon José Ignacio Carballo Nuñez de Castro (18th century) as the person who, in 1783, translated Goulard's work and his almost universal remedy. The preparation he described was based on generating lead acetate by boiling vinegar with lead oxide, mixed with melted fat, with which pieces of fine cloth were impregnated and rolled until a cord was obtained, which was inserted through the meatus in order for the body heat to soften the excipient and release the lead acetate. Thomas Goulard developed another form of preparation by diluting the extract of Saturn in water and alcohol, and hence the name vegeto-mineral water, white water due to its milky color as a result of the breakdown of acetate into lead sulfate, or liqueur of Saturn, i.e., extract of Saturn, which was prepared in different presentations, such as suppositories, poultices, unguents, ointments or irrigation solutions; a topical therapy that at the time was said to cure "without surgery" both phimosis and paraphimosis, and that was applied to almost any skin or inflammatory condition⁸.

We currently know that lead can be found in inorganic and organic form. In inorganic form, it is present in the soil, dust and some paints; it has been used in the manufacture of weaponry and is also used in the construction of buildings and in elements of industrial production. The inorganic presentation form is more easily absorbed and is more toxic. The organic form (tetraethyl lead) can be found in gasoline⁹. In general, lead contamination can occur at the time of its production or during storage¹⁰.

According to the previously described literature, the importance the use of lead acquired in the field of general surgery in the 18th century for an appropriate approach to wounds and ulcers on the skin is evident, which accelerated the healing process and avoided frequent complications, such as infectious processes that deteriorated patient prognosis. With the passage of time, knowledge about lead and its implications on the health of living beings and pollution of the planet has deepened.

Literal transcription of the source document recipe

First formula:

Composition of the Water of Saturn, or Vegeto-mineral Water.

No composition is more simple than that of the vegeto-mineral water; nor is there any remedy which acts with equal celerity or efficacy.

It is made by putting one teaspoon, such as those served for drinking coffee, of the Extract of Saturn into a two-quart bottle of common water, and double the amount of spirit, i.e., two teaspoons. The quantity of the Extract and Spirit may be increased, or diminished according to the nature of the disorder, or the greater or less sensitivity of the part grieved.

First: the Vegeto-mineral Water is a known specific against all external inflammations, and particularly against those of the eye; but when it is made use of for the latter complaint, great care must be taken not to put too much of the Extract of Saturn, for an organ endowed with so great a degree of delicacy and sensitivity requires particular attention. What follows is well worth every one's attention; for it is very certain, that the Extract of Saturn would not fail to irritate, if made use of in too great a quantity; whereas, on the contrary, certain and immediate benefit will accrue, by beginning with it gradually. For example, put at first ten or twelve drops of it to a common glass of water, and increase them gradually, as the inflammation is seen to disperse.

Second: against inflammation of the membrane of the tympanum, and occasional deafness: taking care, in these cases, to add the drops of the Extract, double the number of drops of camphorated spirit; though common spirit may be used, as for inflammations of the eyes.

Third: For the cleansing of wounds, and moistening the bandages and pledgets, especially the borders, or

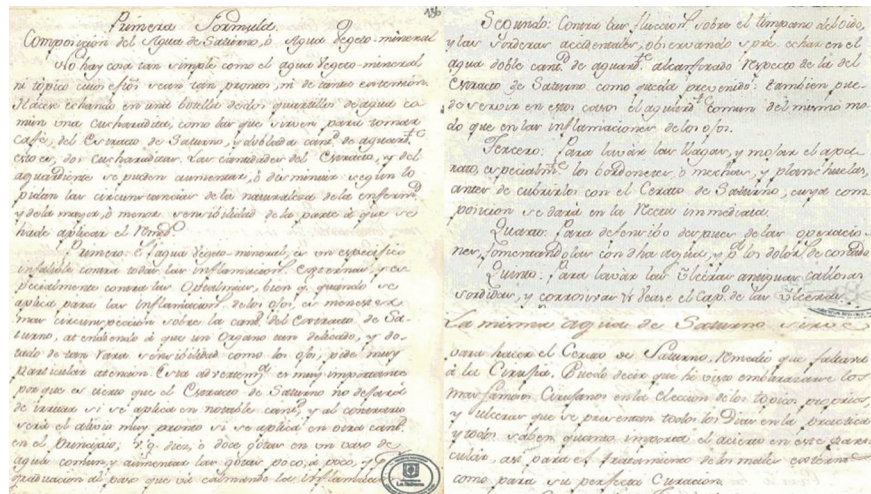


Figure 1. Water of Saturn recipe. Cipriano Rodríguez Santamaría Historical Archive.

mix, and iron them, before they are covered with the Extract of Saturn; whose composition will be given in the immediate recipe.

Fourth: By way of fomentation, after any surgical operation, and for removing pains in the side.

Fifth: For washing old, callous foul ulcers, see the chapter for Ulcers.

The same Water of Saturn is likewise used in the composition of the Extract of Saturn, much hitherto wanted in Surgery. I can say with great truth, that I have seen the most able Surgeons dubious in their choice of proper remedies for the treatment of different kinds of ulcers and wounds, which daily occur in practice: no one can be ignorant, how important such a choice must be, both in regard to the treatment and perfect cure of external evils.

Discussion

The Extract of Saturn was obtained by boiling vinegar with lead oxide mixed with melted tallow. Once this extract was diluted in water and alcohol, it was known as vegeto-mineral extract, a substance that was used in different presentations such as suppositories, poultices, unguents, ointments or irrigation solutions⁸.

One of the treatments indicated for the management of ulcers that was most widely used in the 18th century was known as the “Bayton method”, a simple and inexpensive technique that consisted of covering the wound with a compressive dressing of lithargyrium (lead oxide in the form of sheets) or diakylon (lead oxide and oil ointment), which was moistened with mineral water, thus favoring “healing in a moist

environment”; this technique stimulated the process of degranulation and removal of toxins from the wound caused by devitalized tissue. Some authors suggest that the success of this therapy does not lie in the substances that are used, but in the compressive bandage that had the effect of preventing venous stasis and reducing edema¹¹.

In the original recipe, which we refer to in this article, its anti-inflammatory effect is mentioned, with ophthalmic applications, or for ear alterations, wounds and ulcers. The multiple harmful effects on health secondary to lead exposure are currently known. Intense exposure for a short period is associated with reversible acute kidney injury at proximal tubules, glycosuria, aminoaciduria and hyperphosphaturia; interstitial nephritis has also been documented with continued exposure to this metal¹². At the central nervous system, lead inhibits acetylcholine metabolism, which directly disrupts nerve conduction. In bone tissue, it displaces calcium and subsequently is deposited in the bones, which increases the risk of fractures. In the hematopoietic system, it has been shown to drastically disrupt the synthesis of the heme group, which leads to an alteration in the maturation of red blood cells, which subsequently is manifested by anemia¹³.

Since ancient times, efforts have been made to find the best way to treat skin disorders. Currently, there is a wide variety of strategies available, such as the use of different types of dressings, negative pressure therapies, antibiotics and even growth factors and stem cells. The therapeutic choice will depend on the characteristics of each wound and each patient, always having the safety and timeliness of treatment in mind.

Conclusion

With the passage of time, medical recipes of animal, vegetable or mineral origin were developed for the management of wounds and other skin lesions. One of them was based on lead acetate, or extract of Saturn, obtained by boiling vinegar with lead oxide mixed with melted tallow. In the described colonial medical recipe, anti-inflammatory properties are mentioned after its administration as poultice, unguent, ointment or irrigation solution in wounds and ulcers. Its cytotoxic potential on the central nervous system, renal system and bone tissues, among others, is currently known. However, the memorable achievement made by doctors and apothecaries during the colonial period, who with few or no scientific tools developed a medical treatment, should be highlighted.

Acknowledgements

The authors express their gratitude to Dr. Jorge Uribe Vergara for his contribution to the understanding of the historical context.

Funding

The research and publication process was funded by the universities the authors are affiliated to.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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