

History article

The task of algebraists in New Spain

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Even though in New Spain medical institutions¹ were created to train physicians and surgeons and to take better care of the population, there were specialists who were devoted, whether as a result of their occupation or their liking, to medical and surgical tasks. They included barbers-phlebotomists, charged with making bloodletting incisions, applying suckers and leeches, removing decayed teeth, and providing first aid in case of blows, contusions or sprains. This class also included algebraists, subspecialists devoted to treating fractures and dislocations. I will now provide you with a detailed explanation of the role algebraists played, as they dominated the field of the musculo-skeletal lesions in the colonial society.

In order to solve the health problems, the society in New Spain established a body of physicians and surgeons who had the theoretical and practical foundations needed to treat conditions with a better discernment and likelihood of cure; other people who practiced medicine included: impostors, charlatans, and quacks pretending to be physicians and owners of different secrets to cure all ailments, particularly incurable diseases.

They all had to present their credentials and pass an exam before the Protomedicato Court, a body that authorized practice; however, roles were frequently supplanted due to the shortage of physicians, sometimes with approval and sometimes without it.²

Health care providers in the New Spain society were divided into:

a) The doctor, a graduate who had completed his courses without getting involved in surgeries, his activity focused mainly on theoretical aspects. He only diagnosed. The Latin surgeon was the one who had studied in Latin. He had less knowledge and acceptance than physicians, but occupied a higher position than the practitioners located on a lower

rank on the scale; his field of practice was consequently, quite extensive, despite his limitations.

b) Romancist surgeons. Romancists were those who had studied in Castilian and practiced surgical specialties. They were in charge of attending deliveries, practicing algebra or reducing bone dislocations, performing eye surgeries and reducing or operating hernias.³

These specialists were complemented by the bloodletters, the phlebotomists, the midwives, and a particular group called algebraists (empiric orthopedists). The latter were practitioners who healed fractures, head injuries, dislocations and sprains. Algebraists were also the specialists devoted to mathematics and also those knowledgeable on the art of fixing bones that had been dislodged from their natural site and position. This art was considered as part of practical surgery.⁴

The job of algebraists consisted of properly performing the art of repositioning dislodged bones and uniting the broken ones; they had to know certain aspects of bones, such as, the natural figures of all the bones, the part of the body in which they were located, and how they were constituted with respect to each other, so they could place the bones at the injury site and apply the corresponding cure in case of fractures.

It was important for algebraists to know the number of bones that constituted each part of the body, since there

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1 In 1768 the Royal College of Surgery was created with the purpose of training skilled surgeons that would treat the population's diseases. The following subjects were taught: Anatomy, physiology, surgery, surgical clinic and foundations of legal medicine. The surgery class included teaching how to place bandages for both wounds and fractures and the practice of suture placement.

2 Noemí Quezada. «El Curandero Colonial, representante de una Mezcla de Culturas» en *Medicina Novohispana. Siglo XVI. Historia General de La Medicina en México*. T. II. Coord. Gonzalo Aguirre Beltrán y Roberto Moreno de los Arcos. México, Academia Nacional de Medicina/UNAM, 1990, p. 313.

3 Francisco de Asís y Flores. *Historia de la medicina en México desde los indios hasta la presente*. Volume II. México, Instituto Mexicano del Seguro Social, 1992, p. 381.

4 From the Arabic «al-jabr» that means reuniting or reconstructing. The word «algebra» (also called Amucabala by the Arabs) comes from the Arabic and means "reduction", surgical operation through which the dislocated or fractured bones are reduced (the algebraist was the doctor that repaired the bones).

are bones with different constitution and form that represent a certain difficulty when they become dislodged. Another aspect they had to know was how bones were united with each other, as this knowledge allowed them to put the dislodged bones back into place. Moreover, they needed to know the cavity of each of the bones because if one of them fell out of place due to a fall or blow, they knew where to reduce it in order to put it back into place. They also had to consider the substance in the bones that is cancellous or solid and dense, hard, soft, thick or thin, rough or smooth.⁵

Based on this knowledge, the fractured bone was repositioned with the assistance of devices, techniques invented by physicians of the old times, like Hippocrates and Cos, and the help of three or four assistants. For example, shoulder fractures were fixed with the help of three assistants. The patient's armpit was placed on the shoulder of a taller person or in a higher spot, so it could hold the patient's weight, while the arm was stretched downwards and the elbow was moved towards the bone protrusion.⁶ The restoration of this fracture took 24 days. It is important to note that the age of the individual experiencing these fractures mattered, as older or younger patients' fractures healed later or sooner than expected.⁷

Algebraists clearly understood that curing bone fractures, besides the diet and the rest period, was based on four intentions:

The first intention consisted of leveling out the bone and putting it back into place.

The second intention consisted of preserving the union;

The third intention referred to linkage and the proper site, and finally,

The fourth intention consisted of defending it from possible accidents. Poultices prepared with beaten egg whites mixed with powder of roses and dragon's blood (Croton lechleri) were then applied.⁸

5 Luis Mercado. *Instituciones que Su Magestad mando hazer al doctor Mercado su médico de cámara, protomédico general para el aprovechamiento y examen de los algebristas: en las quales se declaran las diferencias que ay de coyunturas y los modos que puede aver de desconcertarse. Asimismo como se pueden y deben reducir a su figura y lugar*. Madrid, 1599.

6 Ídem., pp. 74-5.

7 Alonso López de Hinojosos. *Suma y Recopilación de Cirugía con un arte para sangrar muy útil y provechosa*. México. Colección la Historia de la Medicina en México. 1977, p. 198.

8 Juan de Esteynefer. *Florilegio Medicinal de todas las enfermedades sacado de varios clásicos autores para bien de los pobres y de los que tienen falta de médicos, en particular para las provincias remotas, en donde administran los RR PP misioneros de la compañía de Jesús. Reducido a tres libros. Primero de medicina, el segundo de cirugía, con un apéndice, que pertenece al modo de sangrar, abrir, y curar fuentes, aplicar ventosas, y sanguijuelas: el tercero contiene un catálogo de los medicamentos usuales, que se hacen en la Botica, con el modo de componerlos*. Madrid. Libro segundo. "De las Fracturas". Cap. XLI, pp. 433-4.

Poultice applications were followed by the application of a Galapagos type of bandage; it is a wide, one-third bandage, sufficiently long, that is made by cutting the goats so that you get four bandages in one, to tighten the splint without lifting the painful part; you need to have five or six thin splints, or cowhide like the one used in shoe soles or cardboard cut as splints, which are wrapped in cotton so that they do not cause injury upon contact.⁹

The splints should be four or six fingerbreadths longer than the bone fracture. The distance from splint to splint should be around one fingerbreadth.

If the splint was not secure enough to cover the shoulder or leg fracture, vilmas or gotieras could be used. A vilma is a piece of cardboard or wood, two or three fingerbreadths wide, and half foot or one fourth long, based on the application site. They are used for fractures of the extremities. A gotiera is a type of vilma built with more or less long and wide grooves. It is made of tin. Its use, as well as that of vilmas, consists of maintaining the extremities when they are fractured.¹⁰

These empiric orthopedists "were capable of treating all types of fractures, strains and dislocations based on their experience. They would carry books by European physicians in their suitcases, with the widespread use of books by Hippocrates.¹¹ We have learned about their conception of medicine, based on experience and observation, through the treaties attributed to the famous Corpus hippocraticum or Hippocratic Corpus, a set of medical theories of the era compiled by the Kos medical school and collected in 53 volumes whose best known texts include «aphorisms», «epidemics», «fractures, joints and head injuries», «on airs, waters and places», «on aliment», and «on the nature of man».¹²

Even though the following works «On articulations» –peri arthron–, «On fractures» –peri agmon– and «The lever» –mohlikós– are important, it was in the book «On fractures» that he introduced the continuous traction techniques, immobilization with splints, progressive compression with bandages that allow the extension and counter extension of the limbs, besides specifically describing the different types of fractures (clavicle fractures, elbow and shoulder dislocation, and spine fracture with and without nerve disorders) and their securing period, which had to be from seven to eleven days. Complicated fractures were treated like simple fractures.¹³

9 Íbidem.

10 Francisco Canivell. *Tratado de vendages y apósitos para el uso de los reales colegios de cirugía ilustrado con once laminas. En que se manifiestan los apósitos necesarios a cada operación separados, como aplicados con sus correspondientes vendajes, para la más fácil inteligencia de los principiantes*. Madrid, 1763, p. 10.

11 Conocido por haber otorgado a la medicina una metodología sistemática y científica y por haber definido por primera vez la posición y el papel del médico en la sociedad.

12 Rogelio Herreman. *Historia de la Medicina*. México, Trillas. 2003, p. 57.

13 Departamento de Ciencias Sociales. Facultad de Ciencias de la Salud. «Historia de la Traumatología y la Ortopedia» en <http://www.uc.edu.ve>

The text recommended to always keep limbs in their natural position to achieve the perfect healing of the injured bone.

Whenever algebraists were called to treat fractures, they tried to repair the anatomical integrity by reducing and immobilizing the affected part; the initial bandage had to be exchanged on days three and seven, once inflammation had decreased, to readjust the pressure of the bandages, estimating a mean healing time of around thirty days. They especially emphasized open fractures, because they were some of the most complicated breaks, since they involved loss of fragments, major skin injury, soft tissue damage and gangrene.

An open fracture is an open door to harbor bacteria that may contaminate and infect the wound, so emergency treatment is required. Although the algebraists had no knowledge about what caused infections, they knew how dangerous they were and would use ointments and wine compresses without tight bandages. They developed special splints for tibial fractures. The methods to stabilize fractured bones included the bandages soaked in resins, rubber and waxes, according to the Hippocrates description, which was frequently applied by algebraists.¹⁴

To perform their cures, algebraists used devices such as those described in the third Hippocrates book, «The Lever», where he refers to the Hippocratic bench used to reduce fractures and deformations of the spine («scamnum»). This device allowed for treatment of musculoskeletal problems through the manual exercise therapy technique and postural orientation. This way attempts were made to relieve pain and strain thus restoring normal movements. The Hippocratic bench was used until the mid 19th century.

We must note the fact that this treaty specifically mentions the relationship between the spinal hump and pulmonary tuberculosis. Hippocrates had basic anatomical knowledge with the exception of the osteology summarized in this book. Only a few joints and some muscle groups of the arm and leg are described in detail.¹⁵

The Hippocratic ladder was a device used by algebraists to treat fractures and dislocations. The ladder contained hooks and ropes to tie the patients when they did not have enough help, the method consisted of placing the patient on one step on one side of the ladder while the fractured arm was passed to the other side and placed on the step, then the arm was fixed using a ball placed under the armpit and the ladder was lifted so the patient was lifted from the floor. Then one assistant pulled a bandage that was tied above the elbow or the entire arm and another one pulled the patient's neck, so that both pulled downward and the other arm was tied backwards, this way the head of the bone was repositioned and put back into place. Then the patient was taken down very carefully without sudden movements so as not to affect the arm, he was given medications and laid in bed.¹⁶

The ladder also served as an alternative method to treat dislocations. The treatment to reduce a dislocated shoulder was similar. The ladder with steps placed at a distance of half a yard was fixed and then placed almost straight; and then on a step, half a yard higher than the patient's shoulder, small cloths were tied forming a ball the size of an egg and very hard: a small bench, half a yard tall, was placed at the foot of the ladder, and the feet were placed on it; with the patient standing up, the armpit of the dislocated shoulder was placed on the aforementioned ball made of cloths on one of the steps; once the patient was in this position, the man acting as a surgeon pulled the patient's arm downward on the other side of the ladder with both hands, at the same time, the bench where the patient was standing was removed so he would hang from the shoulder. The body weight and the extension of the arm by the surgeon reduced the bone in place. Once the bone was back in place, a poultice or plaster was applied and pressed.¹⁷

Another technique algebraists used without using the ladder to treat shoulder dislocation consisted of «placing the patient on the bed or the floor and placing a ball or snarl under his armpit. One of the assistants pulled the fractured arm, while another one would press upward with the ball so this would thrust the shoulder head back into place.¹⁸ Once the procedure was over, the corresponding medications were applied, like a poultice made out of beaten egg whites with a little bit of rose oil, ram suet, Armenian bole, dragon's blood and incense.

The necessary bandages and bands were also available, including a bandage called galapago, a one-third wide bandage that was quite long and made by cutting the edges so that four bandages could be obtained from one and used to tighten the splints without lifting the painful part. Five or six thin splints were also used, or shoe sole cowhide or cardboard cut as splints, which were wrapped in cotton to keep from causing injury upon contact, they were soaked in egg whites or vinegar; the splints had to be four to six fingerbreadths longer than the bone fracture.¹⁹ The patient had to rest lying on his back and eat a proper diet based on chicken broths.

Although algebraists did not have a professional title, all the population strata turned to them, as is evidenced by the fact that, until the French Revolution, all the kings found it convenient to have one or several of these empirics close to them. For instance, King Phillip II of Spain ordered Luis Mercado, a Spanish professor of Medicine in 1572, and the king's physician, to write a book to standardize algebraists' practices in 1599 under the title *Instituciones que Su Magestad mandó hazer*

14 Ibídem

15 Ibídem

16 Ídem, pp. 79-81

17 Juan de Esteynefer. De la dislocación del hombro. Cap. XLV. Op. cit., p. 450.

18 Francisco Fernández del Castillo. *La cirugía Mexicana en los siglos XVI y XVII*. E.R.Squibb & Sons, México, 1936, pp. 31.

19 Ídem. pp. 31-32.

*al doctor Mercado su médico de cámara, protomédico general para el aprovechamiento y examen de los algebristas: en las cuales se declaran las diferencias que hay de coyunturas y los modos que puede haber de desconcertarse. Así mismo, como se pueden y deben reducir a su figura y lugar. Y últimamente se trata de los huesos que se encuentran quebrados y de la manera de su curación.*²⁰ (Work instructions His Majesty gave doctor Mercado, his personal physician, and general protomedicus, for algebraists' proficiency and exam: which stated the different joints and their forms of dislodgement. Moreover, how they can and should be reduced to their shape and place. And lastly, it deals with the broken bones and how they can be cured).²⁰ The purpose of this text was to regulate the professional activities of algebraists living in Spain and the colonies, requesting a minimum training by means of an exam they had to take before the Proto-medico. The Indians accepted the algebraists' practices, eventually followed by the blacks and the castes. The Spanish turned to the algebraists as often as individuals from other groups. Algebraists were one of the many health specialists that penetrated the New Spain society, but the authorities tried to prove that medical efficiency only came from the knowledge of the Spanish physicians and invalidated their practice. This was the social justification to criticize and make them disappear.

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²⁰ Luis Mercado. Instituciones que su majestad mandó hacer al Doctor Mercado su médico de Cámara, Op. cit., p. 134