

Asepsis and antisepsis used by Mexican surgeons in the 19th Century

Asepsia y antisepsia usada por los cirujanos mexicanos en el Siglo XIX

Diego Emiliano Meraz-Brenes,* Carlos Agustín Rodríguez-Paz†

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ABSTRACT

The 19th Century represented a period of significant advances and challenges in surgical practice. Despite facing precarious hygienic conditions and limited resources, Mexico stood out as a pioneer in the empirical development of asepsis and antisepsis techniques. This article examines books, articles, theses, and magazines from the 19th century to describe the evolution of healing methods in three different stages: the pre-antiseptic era (1801-1860) where we observe the use of antiseptic substances even prior to the works of Lister; the beginning of antisepsis (1860-1880), marked by the first attempts to implement more advanced sanitary techniques; and the subsequent advances from the Lister method (1880-1900) where alternatives were sought to adapt it to the local context and contributions were made based on experimentation in the field of asepsis and antisepsis, marking the formalization of these practices in Mexico.

RESUMEN

El siglo XIX representó un periodo de significativos avances y desafíos en la práctica quirúrgica. México, a pesar de enfrentar condiciones higiénicas precarias y recursos limitados, se destacó como pionero en el desarrollo empírico de técnicas de asepsia y antisepsia. Este artículo examina libros, artículos, tesis y revistas del siglo XIX para describir la evolución de los métodos de curación en tres etapas distintas: la etapa preantiséptica (1801-1860) donde observamos el uso de sustancias antisépticas incluso previas a los trabajos de Lister; el inicio de la antisepsia (1860-1880) marcado por los primeros intentos de implementar técnicas sanitarias más avanzadas; y los avances posteriores a partir del método de Lister (1880-1900) donde se buscaron alternativas para adaptarlo al contexto local y se hicieron aportes basados en la experimentación en materia de asepsia y antisepsia, marcando la formalización de estas prácticas en México.

* Student of the bachelor's degree of Surgeon and Midwife, Instructor of Surgical Techniques; Centro Universitario de Ciencias de la Salud, University of Guadalajara.

† Department of Surgery; School of Medicine. Cuauhtémoc University of San Luis Potosí. Coordination of Surgery. Hospital General de Zona No. 50, Instituto Mexicano del Seguro Social, San Luis Potosí.

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INTRODUCTION

At least before 1880, Mexico did not have the universal concept of tissue infestation that caused Pasteur's bacterial infections, so the term "antisepsis" did not exist, only "wound cleansing", which, according to the medical care philosophy of the Asturias' at the beginning of the 16th Century, was intended to prevent the suffering of the patient^{1,2} in order to allow, in cases where the patient was not resuscitated, the soul to ascend with the creator, which they considered more important than the body. They performed cures with brine, salt water, or vinegar with salt to provide rapid

care to prevent blood loss and, if possible, to save lives.^{3,4}

Sharing this precept, a school of wound cleansing existed, created by the Arabs and medieval monks, whose information was compiled by Agustín Farfan at the end of the 16th Century, where it was recommended to remove any foreign object from a wound and keep it clean.⁵

Speaking of Mexico, in the colonial era, in the text of Dr. Pedro Arias in 1567, hot turpentine was recommended for treating wounds. Pedro Arias, in 1567, recommended using hot turpentines, an oil extracted from pine trees, to treat wounds which was later



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used in house painting as turpentine, being very aggressive to the skin.^{6,7} This management persisted until the nineteenth Century in the hospital services of the Porfirian railroads.⁸ We clarify that there was no previous management in this early period when performing the surgical procedure, only cleansing of wounds already festering.

Thanks to the fact that at the beginning of the 19th Century, patients were registered in the so-called ordinates (books where the indications and ailments of the patients were written down), it is possible to recognize the management of these patients and to know that antisepsis did not exist at that time.⁹

On the way to an era of asepsis and antisepsis, the beginning of independent Mexico was reflected by the application of modern French and German knowledge from the beginning of the 19th century¹⁰ and the opening of academic centers such as the Royal University of Guadalajara in 1792 or the transformation of the Royal and Pontifical University of Mexico in 1833, events that allowed the incorporation of this new knowledge to Mexican medical sciences.¹¹

PRE-ANTISEPTIC PERIOD, 1800-1860

The beginning of the 19th Century in Mexico still started with non-antiseptic measures, of course, due to the lack of bacterial theory. This implies that surgeons operated with their street clothes and performed procedures that might seem barbaric today¹² (Figure 1).

However, at this time, there were the first signs of using antiseptic substances, not knowing the theory behind it. However, it was focused on keeping the wound clean (perhaps in an initial tendency to avoid the bad smell of necrotic or infected tissue).¹³ In this context, we do not know why, in 1850, Dr. Pablo Gutiérrez in Guadalajara emphasized the use of silver nitrate in the management prior to surgery,¹⁴ constituting this manuscript as the first formal antecedent in Mexico of the use of antiseptic substances directed to the management of the wound. A fellow countryman of Dr. Gutiérrez, Dr. Fortunato G. Arce also made use of antisepsis a few years later when he described

that in his surgeries he used “a stream of water to which he had mixed a small amount of carbolic acid” [sic]. The application of alcohol poultices,^{14,15} a practice shared by Hidalgo y Carpio and Barceló Villagrán since they used alcohol on surgical wounds, but the most surprising thing is Dr. Luis G. Muñoz’s obsession for a deep cleaning of his instruments for no apparent reason before 1840,¹⁶ an action that is in line with what the practitioners at the Hospital de San Sebastián in Tampico had to perform, as mentioned in their regulations of 1844.¹⁷

We have no evidence to support scientific communication between surgeons or that they were influenced by any other surgical professor before 1862. Neither do we have data to support that Dr. Pedro Vander Linden, as it is rumored, had taught these elements during his stay in Guadalajara or Mexico.^{18,19} What is interesting is that in these years, independently, the doctors of our country took the first steps to try to clean the tissue before being operated on.



Figure 1: Representation of the performance of a surgery in which the surgeons used street clothes.¹²

BEGINNINGS OF ANTISEPSIS 1860-1880

In this second period that we propose, we have found that there is already a constancy in the management of wounds; some methods described mention that they were washed with cold water and “a linen cloth was brought close to the wound and the flesh was sutured”[sic]; this happened in 1862.²⁰

What we are certain regarding the tendencies of antiseptic substances is that thanks to the war of French intervention between 1862 and 1867, the school of the master Montes de Oca (*Figure 2*) spread the use of Labarraque liquor,^{18,21} used by the French army since the beginning of the XIX century (*Figure 2*).¹³ It was not only the proposal of the Mexican general that we must highlight; in the same era, the use of camphorated liquor from 18 to 20° began to be used, using “balls” of cloth soaked in this liquid to protect the edges of the wounds;²² we do not have evidence to say that the surgeons who accompanied Maximilian implemented these proposals, which would remain as a proposal of local surgical innovation to our country before the Listerian era.

We also highlight other antiseptic practices such as that of Dr. Juan María Rodríguez, who substituted the wood of the instrument shelves for easily washable glass shelves, and doctors Manuel Soriano and Juan Fenelón, who treated the wounded soldiers during the battle of San Luis Potosí in 1872, with linen soaked in carbolic acid and changed and cleaned the bedclothes with Labarraque liquor.²³ The father of modern research in Mexico and founder of the National Medical Institute, Fernando Altamirano, also contributed in 1873, describing the use of iodine to clean surgical wounds.¹⁶

It began the trends in terms of substances such as the management of Dr. Hidalgo Carpio, who described in 1874 the use of 33° cane alcohol for the management of skull wounds,²⁴ demonstrating faster healing and less irritation than with the Cerato threads that were customary by then. Inspired by the publication of Dr. Hidalgo, Dr. Tobias Nunez in 1875 extrapolated its use for



Figure 2: Portrait of Master Montes de Oca.²¹

many trauma procedures and mentioned that master Montes de Oca also made use of 40° alcohol and Labarraque chloride for the treatment of urological surgeries.²⁵ Of course, in order not to be presumptuous, it is necessary to comment that the reading of foreign literature allowed the extraction of new tools to the surgical antiseptic arsenal, such as Bruns' carbonized gauze, which was composed of carbolic acid, white resin, castor oil, and spirits.²⁶

The surgeon and historian Alcántara Herrera considered that in 1877, Dr. Jesús San Martín was who initiated the antiseptic era in Mexico;¹⁶ however, the article of the master Toledo Pereyra²⁷ and our contribution show that it is older than this time. It is relevant to mention that a discussion took place at the National Academy of Medicine in the 1898 session regarding the initiators of listerism in Mexico, where Dr. Ricardo Vértiz (who is also mentioned by Alcántara Herrera as the initiator of these cures in the capital city of Mexico),¹⁶ as well as Drs. Eduardo Liceaga and Jesús San Martín himself.²⁸ It is worth mentioning that

the acceptance of Lister's ideas did not happen immediately around the world; an example is the 1876 Philadelphia Congress, where the English surgeon was invited and his method and technology were rejected but well accepted in Mexico where his principles were immediately incorporated.²⁹

As these methods began to be formalized, their application not only remained in private practice but also spread to hospital institutions, as mentioned by Dr. Heliodoro Valle, who points out that the Beistegui Hospital was a pioneer in teaching modern surgical technique, allowing the antiseptic opening of the wombs. Furthermore, the same author confirmed that physicians such as Montes de Oca, Rodriguez, and Luis Muñoz y Carmona began implementing antiseptic practices based on their intuition. Interestingly, however, there were still prominent figures who resisted these practices. A notable example is Dr. Tobías Núñez, who, according to Valle, alternated the use of the scalpel with a cigarette in hand.²⁸

LISTERIAN PERIOD 1880-1900

Interestingly, the Listerian period in Mexico was characterized by the search for alternatives to the Lister method itself, and few works in our country describe the use of Lister's solution and its additives; Mexican surgeons used solutions

different from those of the prestigious English surgeon.^{30,31}

Proof of this can be seen in the publications of the *Gaceta Médica de México*, where in 1880, the use of materials such as Guerin's cotton packing prevented this theoretical contact of the so-called impure air with wounds, which in the 21st Century we now know is conditioned by fomites and contact with contaminated material, making use of this cotton soaked with camphor alcohol or carbolic acid as recommended by Dr. Tobías Núñez.²⁰ In another article, Dr. Núñez also described that the cost of Lister's method could be reduced by using only carbolic acid in the wound as a pillar of antisepsis. It was not necessary to spray it in the environment as Lister advocated, a situation he demonstrated through experimentation on his amputee patients at the Juárez Hospital, where he described that there was no difference between both methods in the two groups he treated³⁰ (Figure 3).

Ratifying the findings described in this article, Dr. Sandoval, in 1882, confirmed that for decades, there had existed several surgeons who empirically sought the cleaning of wounds long before the microbial theory, as was the case of the use of simple alcohol, dyes, or caustics that acted as germicides, which were used with great success in cases of trauma at the end of the nineteenth Century.³² In 1884, Dr. José María Lugo corroborated that the use of these substances could reduce the points of inflammation and suppuration as in the cases of runover and perianal wounds, by using only phenolated cotton. Acquiring this practice from Dr. Ruiz Sandoval the costs required by the complex Lister's method could be reduced.³¹

Advances did not occur exclusively in terms of new antiseptic substances. Almost while formal operating rooms appeared, the Concepción Beistegui Hospital used sterilizers of boiling water under pressure, acquired in England by Dr. Francisco P. Chacon at the end of 1886, starting the aseptic era for the first time in our country. Among those who contributed to this era was surgeon Ramón Macías, who introduced the use of gloves in Mexico in 1896,¹⁶ and Dr. Fernando López,

"HOSPITAL JUAREZ."			
<i>Amputaciones practicadas durante el primer semestre del año de 1886.</i>			
<i>(Clínica de 2º año.)</i>			
	Muslo.	Pierna.	Brazo.
Amputaciones de.....	2	3	1
Primitivas ó inmediatas.....	1	1	"
Secundarias.....	1	2	1
Curaciones de Lister.....	"	1	"
Curaciones por el procedimiento usado en Clínica.....	2	2	1
Han salido del Hospital perfectamente sanos.....	1	2	"
Quedan curándose.....	1	1	"
Han muerto.....	"	"	1

Figure 3: Table published in the "*Gaceta Médica de México*" showing six cases using the antiseptic method in amputations in 1886.³⁰

Table 1: Details the efficacy of various antiseptics against a variety of pathogenic microorganisms and their ineffectiveness against others.³⁴

Antiseptic	Effective against	Not effective against
Sulfurous acid	Chick cholera microbe	—
Zinc	Pyogenic microbus	—
Silver salt	<i>Aspergillus</i>	—
Copper	Mildew fungus	—
Cal	—	Koch's microbe, carbonaceous bacterial spores
Sulfurous acid	—	Koch's microbe
Hydrochloric	—	Koch's microbe
Carbolic acid	Practically all bacteria	Spores, Eberth's bacillus
Iodoform	Bacillus virgula choleric (slow)	—
Garlic oil	Cholera	—
Mustard	Cholera	—

Table 2: Shows the concentrations and exposure times required for the effectiveness of various antiseptics.³⁶

Antiseptic	Concentration	Time
Mercury bichloride	1:500	10 seconds
Mercury bisulfate	1:8,000	4 minutes
Mercury diiodide	—	4 days
Mercury oxide	Saturated	For 2 to 4 days
Silver nitrate	1:10	4 seconds
Acid	1:600	1 minute
Potassium permanganate	1:50	20 seconds
Carbolic acid	1:20	1 minute
Absolute alcohol	90%	4 to 12 seconds
Hydrogen dioxide	—	1 to 1.5 minutes
Sodium salicylate	1:10	8 to 10 minutes
Boric acid	1:400	Bacteriostatic
Cade oil	—	5 minutes
Clove oil	—	> 24 hours
Pure eucalyptus	—	> 24 hours
Benzol	—	> 24 hours
Resin	—	8 to 12 hours
Iodoform	—	> 12 hours
Iodine	—	> 36 hours

who performed hysterectomies with sterilized instruments and fields.³³

FROM EMPIRICAL TO SCIENTIFIC KNOWLEDGE

Among the pioneers in antiseptic experimentation, we must highlight Dr. Ángel Gaviño Iglesias, who founded the first bacteriology laboratory in Mexico in 1887,³³ where he performed a series of cultures of different pathogens and subjected them to many antiseptic substances, demonstrating that the germicidal effectiveness of each substance was different³⁴ (Table 1). Dr. Gaviño was a great defender of aseptic and antiseptic methods, and his hand did not tremble in refuting those who dared to discredit them since there were still prestigious people who were reluctant to accept such discoveries.³⁵

Adding to the collection of samples of Mexican experimentation, Dr. Bandera set himself the task of specifying the time different substances performed their antiseptic function in 1888, a task he completed with great success³⁶ (Table 2).

Unfortunately, not all authors will be remembered for their achievements since, in a false sense of modesty, some works were left without paternity; an example of this is a thesis describing the use of sodium chloride, widely used in our XXI century and at that time used at a concentration of 0.6%.³⁷ Among other titration works of our country is the description of Mallet Prevost in 1891, who supported a thesis insisting on the need to use two or more substances in the same patient in order to release it efficiently against germs, giving a description very similar to the current times, in terms of the different moments of surgical washing of hands, clothes, and instruments.³⁸

INNOVATION PATH

The trajectory of asepsis and antisepsis in 19th-century Mexican surgery highlights the ability of Mexican surgeons to innovate and adapt amid adverse conditions and limitations of scientific knowledge. Transitioning from empirical and rudimentary practices to more advanced techniques demonstrated a commitment

to continuous improvement. Implementing antiseptic substances such as silver nitrate and alcohol before Lister's work,^{14,23} even without a complete understanding of bacterial theory, reflected an intuition and dedication to surgical practice.

The consolidation of the Listerian era in Mexico at the end of the 19th Century marked a milestone in the history of medicine in the country, with the adoption of sterilization methods and the creation of bacteriology laboratories that formalized and significantly improved surgical practices. The contributions of pioneers such as Dr. Ángel Gaviño Iglesias and Dr. Bandera underlined the importance of scientific research and experimentation in implementing effective antiseptic techniques.^{33,34,36} All this knowledge was distributed in the typical clinic, allowing its use for even the simplest procedures, facilitating the consolidation of an antiseptic surgical practice in Mexico.³⁹

The intention of this work is to describe, as stated by Dr. Toledo Pereyra²⁷ how Mexican surgeons began to accept rules of cleanliness of the areas to be operated and the cleaning of their instruments long before the Europeans, even as was already mentioned, in 1876, the Americans still despised the Lister method,²⁹ By then in Mexico, methods based on alcohol, Labarraque's liquor, and iodized solutions among others were already part of the surgical armamentarium that freed Mexican patients from the inconveniences of bacteria, described years after the discoveries of Lister and Pasteur, a glory that allowed these Anglo-French theories to be accepted immediately by Mexican surgeons.

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REFERENCES

1. Campos-Navarro R, Ruiz-Llanos A. Adecuaciones interculturales en los hospitales para indios en la Nueva España. *Gac Med Mex*. 2001; 137: 595-608.
2. Villanueva L.A. El sistema hospitalario en la Nueva España del siglo XVI. Un tema para la reflexión en el siglo XXI (1ª parte). *Rev Fac Med UNAM*. 2004; 47: 82-86.
3. Esteyneffer J. Florilegio medicinal de todas las enfermedades. Tomo II, Academia Nacional de Medicina. México 1976. p. 551-564.
4. De la Garza Villaseñor L. Dominique Jean Larrey. La cirugía militar de la Francia revolucionaria y el Primer Imperio (Parte I). *Cir Gral*. 2003; 25: 359-366.
5. Rodríguez-Paz CA, Carreón-Bringas RM. Dr. Agustín Farfán, cirujano novohispano del siglo XVI. *Rev Med Hosp Gral Méx*. 1993; 56: 161-165.
6. Arias de Benavides P. Secretos de cirugía. Academia Nacional de Medicina. México 1992, 107-111.
7. Russo JP. Dermatitis por contacto a trementina. *Arch Argent Dermatol*. 2015; 65: 81-85.
8. Rodríguez-Paz CA. El ferrocarril y la atención médico-quirúrgica del mexicano, una aventura de la salud sobre rieles (1880-1920) [Internet]. *Miradaferroviaria.mx*. 2021. Disponible en: <https://www.gob.mx/cultura/prensa/la-revista-mirada-ferroviaria-en-su-edicion-43-rinde-un-homenaje-al-personal-del-sector-salud>
9. Alfredo MS, Izaguirre AR. Las ciencias médicas en México durante el siglo XIX. *Ciencia*. 2011, 68-79. Disponible en: https://www.revistaciencia.amc.edu.mx/images/revista/62_4/PDF/CienciasMedicas.pdf
10. D'Ardois GS. El pensamiento médico mexicano del periodo romántico. *Gac Med México*. 1969; 99: 1010-1015.
11. Ocaranza F. Historia de la Medicina en México. México: MIDY; 1934, 146-148.
12. Izquierdo JJ. Raudón cirujano poblano de 1810. Aspectos de la cirugía mexicana de principios del siglo XIX en torno de una vida. México: Ediciones Ciencia; 1949, 149-155.
13. Gómez De Lara JL, Rodríguez-Paz CA. Un médico convertido en químico. Antoine-Francois de Fourcroy y su influencia en las políticas sanitarias mexicanas. *Saberes Revista de historia de las ciencias y las humanidades* [Internet]. 2021; 4: 142-162. Disponible en: <https://www.saberesrevista.org/ojs/index.php/saberes/article/view/204>
14. Ramírez EC. Apuntes y recopilaciones bibliográficas para la historia del Hospital Civil de Guadalajara de 1791 a 1950. Tomo II La Cirugía. Guadalajara, Jal. Mex: Amat Editorial; 2004, 11-24.
15. Arenas HM, Anaya RP. Historia de la Cirugía General en el Estado de Jalisco. En: León-López G, Campos-Campos SF, editores. *Historia de la Cirugía General en la República Mexicana Vol. III. Asociación Mexicana de Cirugía General*. México: Ed. Graphimedic; 2013, 40-45.
16. Alcántara H.J. Compendio de cronología quirúrgica mexicana. México: Academia Mexicana de Cirugía; 1951, 39-100.
17. Ramos GH. Historia de la Cirugía General en el Estado de Tampico. En: León-López G, editor. *Historia de la Cirugía General en la República Mexicana. Vol. I. Asociación Mexicana de Cirugía General*. México: Ed. Graphimedic; 2011. p. 31-34
18. Rodríguez-Paz CA. El licor de Labarraque, primer antiséptico de los cirujanos mexicanos del siglo

- XIX. *Cir Gen.* 2014; 36: 257-260. Disponible en: http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1405-00992014000400257&lng=es
19. Chávez-Marín CA. *Vander Linden y el cuerpo médico militar mexicano siglo XIX.* México: Heriberto Daniel Camacho Fernández; 2023.
 20. Núñez T. Método de curación: empaque algodonado (ouaté de Guérin) y antiséptico de Lister. *Gac Med México.* 1881; 16: 161-175.
 21. Aguilar GF. *Cirujanos de ayer.* México: Bayer; 1938, 18-20.
 22. Anónimo. Curación de las heridas con el alcohol. *Gac Med México.* 1864; 65: 431-498.
 23. Quijano F. El inicio de la antisepsia en México (1872). *Gac Med México.* 1987; 123: 289-291.
 24. Hidalgo-Carpio L. Utilidad manifiesta del alcohol para la curación de las heridas que, interesando los huesos del cráneo, los han dejado expuestos a la acción del aire. *Gac Med México.* 1874; 9: 341-344.
 25. Núñez T. Utilidad del alcohol empleado como tópico en las heridas. *Gac Med México.* 1875; 10: 309-315.
 26. Bruns P. Gasa carbolizada de Bruns. *Gac Med México.* 1879; 14: 145-152.
 27. Toledo-Pereyra LH. Introducción de los principios antisépticos de Lister en México y España. *Cir Gral.* 1995; 17: 192-197.
 28. Valle RH. *La cirugía mexicana del siglo XIX.* México: Tipográfica Sag; 1942.
 29. Bracho RLR, Linden GB. Historia de la Cirugía General y de los Cirujanos del Estado de Durango. En: León-López G, Campos-Campos SF, editores. *Historia de la Cirugía General en la República Mexicana Tomo III.* Asociación Mexicana de Cirugía General. México: Graphimedic; 2013, 11-13.
 30. Núñez T. Algunas palabras sobre el método antiséptico de lister. *Gac Med México.* 1886; 21: 517-529.
 31. Hidalgo JML. Un procedimiento económico de antisepsia. *Gac Med México.* 1884; 19: 217-221.
 32. Sandoval GR. Tratamiento antiséptico de los traumatismos. *Gac Med México.* 1882; 17: 311-317.
 33. Sánchez G. *Medicina mexicana del siglo XIX. Unidades de Apoyo para el Aprendizaje.* CUAED/Facultad de Medicina-UNAM. 2020.
 34. Gaviño Á. Antisepsia, asepsia y desinfección. *Gac Med México.* 1892; 27: 447-463.
 35. Gaviño Á. Juicio crítico de la memoria del Sr. Lavista a propósito de la discusión sobre antisepsia. *Gac Med México.* 1892; 29: 298-311.
 36. Bandera JM. Los antisépticos probados por la bacteriología. *Gac Med México.* 1888; 23: 209-214.
 37. Anónimo. La solución esterilizada de cloruro de sodio como medio de asepsia quirúrgica. *Gac Med México.* 1890; 25: 395-396.
 38. Mallet Prevost W. Observaciones sobre la teoría y práctica del antiseptismo. [México]: Universidad Nacional Autónoma de México; 1891.
 39. Ortega R. Reflexiones sobre asepsia y antisepsia. *Gac Med México.* 1910; 3: 213-218.

Correspondence:**Diego Emiliano Meraz-Brenes****E-mail:** emilianomerazmb@gmail.com