ISSN 1405-0099

VOLUME 45, No. 2 APRIL-JUNE 2023

Cirujano General

2023

Internet: http://www.amcg.org.mx
www.medigraphic.com/cirujanogeneral

Official Scientific Publication of the
ASOCIACIÓN MEXICANA DE CIRUGÍA GENERAL, A.C.
E-mail: revista@amcg.org.mx

Indexed at LILACS, BIREME-OPS

Contents

Cirujano General

Official Scientific Organ of the Mexican Association of General Surgery, A.C.

Designed, produced, and primted in Mexico by: graphimedic S.A. de C.V. Tels: 55-85-89-85-27 to 32. E-mail: emyc@medigraphic.com Printed in Mexico.

Available in full version at: www.medigraphic.com/cirujanogeneral

Contents

Cirujano General

Mexican Association of General Surgery, A.C.

Directive Board 2022-2023

Contents

Cirujano General
April-June 2023
Vol. 45, no. 2

EDITORIAL

ORIGINAL ARTICLES

REVIEW

CLINICAL CASES

HISTORY, ETHICS AND PHILOSOPHY

Cirujano General
Abril-Junio 2023
Vol. 45, núm. 2

EDITORIAL

ARTÍCULOS ORIGINALES

ARTÍCULO DE REVISIÓN

CASOS CLÍNICOS

HISTORIA, ÉTICA Y FILOSOFÍA

EDITORIAL
doi: 10.35366/111506

Cirujano General
April-June 2023
Vol. 45, no. 2 / p. 65-66

Use of ChatGPT in scientific manuscripts

Uso de ChatGPT en los manuscritos científicos

Abilene Cirenia Escamilla Ortiz*

GPT is a type of artificial intelligence developed by OpenAI in November 2022 and designed to generate human-like text. It is a language model often used in chatbots, computer programs capable of holding a text or voice conversation with a human.[1,2]

Chatbots and natural language processing, including ChatGPT, can revolutionize medical publishing by automating some tasks and streamlining the writing process. It has been mentioned that they can help extract information from electronic records, assist in medical literature searches, or be a guide in writing style and format.

Several experts and medical journals reject the use of ChatGPT since it lacks critical thinking and presents redundant and irrational information; its use means that there are no original ideas and the points cannot be argued; and in the case of using it in a scientific manuscript the content will be from the bot, with this comes medical-legal and intellectual property or authorship problems.[2]

ChatGPT does not have access to PubMed or Cochrane. Therefore, there are gaps in the information it provides, and it needs to be able to elaborate a structured discussion.[2] It can be used to review material, to make a constructive brief but not to make an original blueprint. It requires a human intellectual mind and policies that verify the data generated by artificial intelligence systems.

ChatGPT has already been listed as an author in some scientific articles; some editors think there are better decisions than this. The authorship of an article confers credit for the contribution and responsibility for the content of the work, as stated by the Committee on Publication and Ethics (COPE) and the International Committee of Medical Journal Editors (ICMJE); the latter recommends that for someone to be an author, they must have a substantial contribution, design of the work, interpretation of the data, drafting or critical review, in addition to having final approval of the version to be published; according to this, a chatbot should not appear as an author, but only have an acknowledgment in the article.[3]

Publishing companies want to create policies for using chatbots, but it is still a controversial topic that needs to be clarified. It could be a tool to detect plagiarism; it would care for language and syntax in articles, and statistical verification would be easier. ChatGPT should be able to tell if a human or computer program did the manuscript.[4]

It should suggest to journals that the author declare that if artificial intelligence were used to complement the manuscript, it would achieve better transparency.[5] The World Association of Medical Editors (WAME), has issued recommendations regarding ChatGPT.

Chatbots cannot be authors; authors must be clear and express how they used chatbots. Authors are responsible for the use of chatbots in their manuscripts. Publishers will need tools to detect content generated by artificial intelligence.

If there are no clear rules, medical journals should not authorize using chatbots or artificial intelligence for manuscript preparation, and,

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How to cite: Escamilla OAC. Use of ChatGPT in scientific manuscripts. Cir Gen. 2023; 45 (2): 65-66. https://dx.doi.org/10.35366/111506

above all, everything related to authorship should be clarified.

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ORIGINAL ARTICLE
doi: 10.35366/111507

Cirujano General
April-June 2023
Vol. 45, no. 2 / p. 67-75

Academic proposal from the Mexican Association of General Surgery for establishing a referral program for the training of the general surgeon in Mexico

Propuesta académica de la Asociación Mexicana de Cirugía General para establecer un programa de referencia para la formación del cirujano general en México

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Keywords: academic program, referral, general surgery, Mexican Association of General Surgery.

Palabras clave: *programa académico, referencia, cirugía general, Asociación Mexicana de Cirugía General.*

ABSTRACT

Introduction: medical education has evolved from topically focused programs to one focused on quality outcomes and competencies. Different models and educational content have been suggested to train general surgery specialists worldwide. However, in Mexico, there is only one program for all the training centers for specialists in general surgery, which has given rise to a vast heterogeneity of educational quality levels and clinical results in our country. **Objective:** to structure an academic program that serves as a reference for all academic institutions that train specialists in general surgery in our country. **Material and methods:** the development of the proposed reference program for the training of general surgeons (PRFCG) consisted of five phases: 1) review and integration of the best structured national and international programs by a committee; 2) review and consensus by academic professors, experts, and associates of the initial program; 3) review and consensus through Delphi methodology (consensus > 75%) by working tables that worked remotely before the XVIII National Surgeon's Meeting; 4) presentation and discussion of the results of these working groups at the XVIII Meeting; and 5) presentation and dissemination of the PRFCG at the XLVI International Congress of Surgery held in the city of Merida, Yucatan, as well as to the competent authorities of the National Autonomous University of Mexico to propose its integration into the single program of medical specialties. **Results:** the final product of this process was consolidated with the support

RESUMEN

Introducción: *la educación médica ha evolucionado desde programas centrados en tópicos, hasta la que se enfoca en la calidad de los resultados y competencias. Diferentes modelos y contenidos educativos han sido sugeridos para la formación de médicos especialistas en cirugía general en todo el mundo. Sin embargo, en nuestro país no existe un programa único para todas las sedes formadoras de especialistas en cirugía general, lo que ha dado pie a una amplia heterogeneidad de niveles de calidad educativa, así como de resultados clínicos en nuestro país.* ***Objetivo:*** *estructurar un programa académico que sirva como referencia para todas las instituciones académicas formadoras de médicos especialistas en cirugía general de nuestro país.* ***Material y métodos:*** *el desarrollo de la propuesta del programa de referencia para la formación de cirujanos generales (PRFCG) constó de cinco fases: 1) revisión e integración de los programas nacionales e internacionales mejor estructurados por un comité; 2) revisión y consenso hecho por profesores académicos, expertos y asociados del programa inicial; 3) revisión y consenso mediante la metodología Delphi (consenso > 75%) por mesas de trabajo que trabajaron a distancia previo al XVIII Encuentro Nacional del Cirujano; 4) presentación y discusión de los resultados de estas mesas en el XVIII Encuentro; y 5) presentación y difusión del PRFCG en el XLVI Congreso Internacional de Cirugía que se llevó a cabo en la ciudad de Mérida, Yucatán, así como ante las autoridades competentes de la Universidad Nacional Autónoma de México para proponer su integración en el Programa Único de Especialidades*

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Received: 11/01/2022
Accepted: 12/16/2022

How to cite: Velázquez-Fernández D, Pérez-Soto RH, Muñoz-Maldonado GE, Herrera-Hernández MF. Academic proposal from the Mexican Association of General Surgery for establishing a referral program for the training of the general surgeon in Mexico. Cir Gen. 2023; 45 (2): 67-75. https://dx.doi.org/10.35366/111507

and participation of more than 200 professors and experts, 620 associates, 14 coordinators, and 54 experts who worked for the creation of a program with 27 cognitive units, nine transversal competencies, eight attitudinal competencies, 21 rotations, 92 surgical procedures proposed in a logbook, as well as five reliable professional activities (APROC) as part of the PRFCG. The complete program is contemplated for four-year training with a flexible academic structure. **Conclusions:** this PRFCG refers to "standardizing" the minimum academic elements necessary for training a general surgery specialist. The mission of this project is not to impose a program but to facilitate, through different means, a surgical education of the highest quality within the reach of all Mexicans with the support of the Mexican Association of General Surgery, A.C. (AMCG).

Médicas. ***Resultados:*** *el producto final de este proceso se consolidó con el apoyo y participación de más de 200 profesores y expertos, 620 asociados, 14 coordinadores y 54 expertos que trabajaron para la creación de un programa con 27 unidades cognitivas, nueve competencias transversales, ocho actitudinales, 21 rotaciones, 92 procedimientos quirúrgicos propuestos en bitácora, así como cinco actividades profesionales confiables (APROC) como parte del PRFCG. El programa completo está contemplado para un entrenamiento de cuatro años con una estructura académica flexible.* ***Conclusiones:*** *se presenta este PRFCG como una referencia con la intención de "estandarizar" los elementos académicos mínimos necesarios para la formación del especialista en cirugía general. La misión de este proyecto no es imponer un programa, sino facilitar a través de diferentes medios una educación quirúrgica de la más alta calidad al alcance de todos los mexicanos con el apoyo de la Asociación Mexicana de Cirugía General, A.C. (AMCG).*

Abbreviations:

AMCG	=	Mexican Association of General Surgery, A.C.
APROC	=	reliable professional activities.
ATLS	=	life support to the polytraumatized patient.
CMCG	=	Mexican Council of General Surgery, A.C.
EPA	=	entrustable professional activities.
FES	=	Fundamentals of Endoscopic Surgery.
FLS	=	Fundamentals of Laparoscopic Surgery.
IMSS	=	Mexican Social Security Institute.
ISSSTE	=	*Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado*.
PEMEX	=	*Petróleos Mexicanos*.
PRFCG	=	reference program for the training of general surgeons.
PUEM	=	unique program of medical specialties.
SEDENA	=	Secretary of National Defense.
ICU	=	Intensive Care Unit.
UNAM	=	National Autonomous University of Mexico.

INTRODUCTION

The programs for the training of resident physicians in general surgery have evolved over the years as they have been impacted by pedagogical and didactic trends that have also been changing.[1-3] These models have migrated from one centered on student learning or knowledge to models focused on quality patient care and reliable, high-quality professional activities.[4-8] Medicine has shifted from being exclusively focused on diagnosis and treatment to being focused on the clinical outcomes of the patients that this professional practice impacts.[9,10]

In recent years, with the advent of the competency-based education model,[10,11] training programs have been integrated in different parts of the world,[12,13] as the USA,[14,15] Canada,[9] Europe,[16] and Australia.[17,18] The components of this model, which aims not only a significant learning in the cognitive area but also practical, emotional, motor, and disciplinary skills that integrate an optimal and pragmatic professional behavior of the specialist in general surgery.

A surgeon's competence to obtain good results is not only an educational element but a fundamental and moral commitment in the surgeon's relationship with his/her patient.[19] Moreover, these competencies can be operationalized and evaluated objectively when linked to the results, quality of the procedure, as well as the professional activities of each surgeon.[20,21]

This program presents a flexible model based on competencies. It is structured based on the unique medical specialties (PUEM) program issued by the National Autonomous University of Mexico (UNAM) and 27 high-quality national and international programs for training specialists in General Surgery. This flexible model is based on four core competencies that every general surgeon should ideally have upon residency completion, in addition to a professional portfolio of evidence to support these competencies. The

competencies and portfolio that make up this program are detailed below:

1. **Disciplinary competencies** (specific to the specialty or area of knowledge such as rotations in other services, hospitals, and areas of medical or biomedical specialty).
   a. **Cognitive or theoretical competencies** (or introductory and advanced knowledge that previously structured the academic programs of the residency).
   b. **Motor or procedural competencies** (which characterize the general surgeon when contrasted with other medical specialties and should be evaluated similarly to the cognitive level).
   c. **Rotations** (some rotations in different areas are suggested to acquire additional competencies).
   d. **Attitudinal competencies** (cognitive and motor skills specific to this specialty and other branches of medical sciences recommended to be included in general surgery resident training, such as ATLS, FLS, FES, and others).
2. **Transversal competencies** (which are not exclusive to the surgical specialty, but any physician or citizen should have, such as ethics, professionalism, and collaboration).
3. **The professional portfolio** should contain the evidence that proves the above competencies and periodic evaluations.

According to all the professionals who participated in structuring this program, these competencies are specific functions of the general surgeon. All the opinions were integrated into five phases within the collaboration between the *Asociación Mexicana de Cirugía General, A.C.* (AMCG) and the *Consejo Mexicano de Cirugía General, A.C.* (CMCG).

Objectives

1. To structure an academic program that serves as a reference to "standardize" the minimum educational elements necessary for all academic institutions that train medical specialists in general surgery in our country.
2. To reach a consensus among all the experts and professors associated with the AMCG (and some external advisors) on the areas of knowledge, disciplines, and competencies that a general surgeon should learn and master.

MATERIAL AND METHODS

The development of this proposal for the PRFCG had five phases:

Phase 1. In this phase, a committee composed of the presidents and coordinators conducted a careful, thorough, and extensive review of all the existing curricular programs for the training of resident physicians in the specialty of general surgery in Mexico (n = 15), USA, Canada,[21] Australia, Europe, and other countries.[6,13] These programs were contrasted with our country's most commonly used program, the PUEM, for general surgery, which served as a starting point and baseline reference. The programs were edited to eliminate redundancies, repeated topics, or topics that are no longer current.

Phase 2. The final proposal of the first phase was initially exposed to all invited professors, chiefs of teaching, and academic surgeons (who are known as opinion leaders in surgical education) from all academic units that train specialists in general surgery and from all over the country, to criticize and provide feedback on the survey. In an initial approach, these guests were selected by the university, faculty, or hospital, trying to seek federal and regional representativeness. Subsequently, the same survey was launched to all the associates of the AMCG, again seeking federal representativeness and representation of the private and public health sectors (Mexican Social Security Institute [IMSS], Ministry of Health, Institute of Security and Social Services for State Workers [ISSSTE], Ministry of National Defense [SEDENA] and *Petróleos Mexicanos* [PEMEX]). The database was cleaned with these experts' suggestions, comments, and corrections.

Phase 3. The program was divided into the different competencies proposed in the PRFCG, and seven working groups were formed, which

met online or in person for three months to discuss each of the program sections to modify or correct it. The Delphi methodology was used as a strategy until a consensus of at least 75% of the experts invited to each working table was reached as a condition for the plan to be integrated.

Phase 4. The program proposed in phase three was reviewed by each of the coordinators of the working tables, four with the final decisions of each of the sections of the PRFCG in the XVIII National Meeting of the Surgeon, on May 11, 2022, within the facilities of the AMCG in Mexico City. The final observations were integrated into a definitive document.

Phase 5. The final edition of the document as a product of the XVIII National Meeting of Surgeons 2022, where the observations of all the participants in this meeting were integrated. The PRFCG was presented during the activities of the XLVI International Congress of Surgery held in the city of Merida, Yucatan, as well as to the competent authorities of the UNAM, to propose its integration into the PUEM for the teaching of general surgery in our country.

To collect the opinion of all associates and professors, we used online surveys through the Survey Monkey platform®. Each table worked on the different competencies and portfolio of pieces of evidence using the Delphi methodology, and included in the final program were only those elements voted by more than 75% of the members. The final consensus was presented by the coordinators of each working table at the XVIII National Meeting of Surgeons.

Each competency was structured according to a list of units, modules, topics, subtopics, and subtopic categories, for the four-year duration of the general surgery residency.

RESULTS

In **phase 1**, four core competencies (cognitive/theoretical knowledge; disciplinary/rotations; motor/procedural; transversal and attitudinal) and a professional portfolio (containing evidence of competencies acquired at different levels of mastery) were integrated into a school-based academic program on a four-year calendar. *Figure 1* shows the general distribution of a standard three-year program and "flexible" in the last fourth year. Both cognitive and procedural or motor competencies were classified according to Bloom's degree of difficulty or category for the digital age.

In **phase 2**, 204 teachers and teaching managers responded to the survey. In this same phase, the survey was also sent to all associates; approximately 770 responded to the study. The federal representativeness and by health care sector that responded to the survey is shown in *Figure 2*. This national representative consisted of 619 individuals (80.38%) who did respond to this question. As can be seen in *Figure 2*, most of the surgeons surveyed who responded were from Mexico City, followed by the State of Mexico, Jalisco, Nuevo Leon, and Guanajuato. The remaining states were represented by 5% or less of the total. As can also be seen in this figure, all the major health sectors of the country were represented in the survey.

In **phases 3 and 4**, the product of the working tables before and during the XVIII National Meeting of the Surgeon 2022 resulted in significant changes in the program. Approximately 60 experts were invited to this meeting, organized in seven working tables with an average of six surgeon educators, professors, or experts, plus two coordinators per table and nine general event coordinators. The complete list of participants in the event is in the acknowledgments at the end of the article.

Phase 5. The final edition of the document resulting from the XVIII National Meeting of Surgeons 2022 was completed, integrating all the observations of all the participants of this meeting. The PRFCG was presented during the activities of the XLVI International Congress of Surgery held in the city of Merida, Yucatan, as well as to the competent authorities of the UNAM to propose its integration in the PUEM for the teaching of general surgery in our country.

The general concept of this program includes standard competencies (previously considered mandatory) and "flexible" competencies (previously optional and now depending on the scope of each program and host hospital) that the residents themselves

can select according to their plans for professional development after obtaining the degree of specialist in general surgery. This way, the residents will be able to adapt to the program depending on whether they want to conclude as general surgeons or enter some other sub or high specialty, in which they will not necessarily need to acquire all the available skills but the particular ones for the following academic degree. In general, they can be classified in the next final items in two professional competencies whose evidence is integrated into a portfolio:

1. Disciplinary competencies (which are subdivided into three competencies specific to the specialty or area of knowledge):
   a. ***Cognitive*** competencies.
      a.1. Systemic response to surgical trauma.
      a.2. Liquids and electrolytes.
      a.3. Hemostasis, bleeding, and transfusion medicine.
      a.4. The surgical wound.
      a.5. Surgical infectious diseases.
      a.6. General aspects of surgery and the surgical patient.
      a.7. Surgical nutrition.
      a.8. Professional profile and competencies of the general surgeon.
      a.9. Trauma surgery.
      a.10. Skin and subcutaneous adipose tissue surgery.
      a.11. Oncology surgery.
      a.12. Gastrointestinal surgery (upper gastrointestinal tract).
      a.13 Colorectal surgery (lower gastrointestinal tract).
      a.14. BPH (benign prostate hypertrophy) surgery.
      a.15. Endocrine surgery.
      a.16. Head and neck surgery.
      a.17. Spleen.
      a.18. Breast surgery.
      a.19. Urology.
      a.20. Bariatric surgery.
      a.21. Obstetrics and gynecology.
      a.22. Plastic and reconstructive surgery.
      a.23. Vascular surgery.
      a.24. Thoracic surgery.
      a.25. Neurosurgery.
      a.26. Transplant surgery.
      a.27. Pediatric surgery.
   b. ***Procedural or motor*** skills (92 procedures).

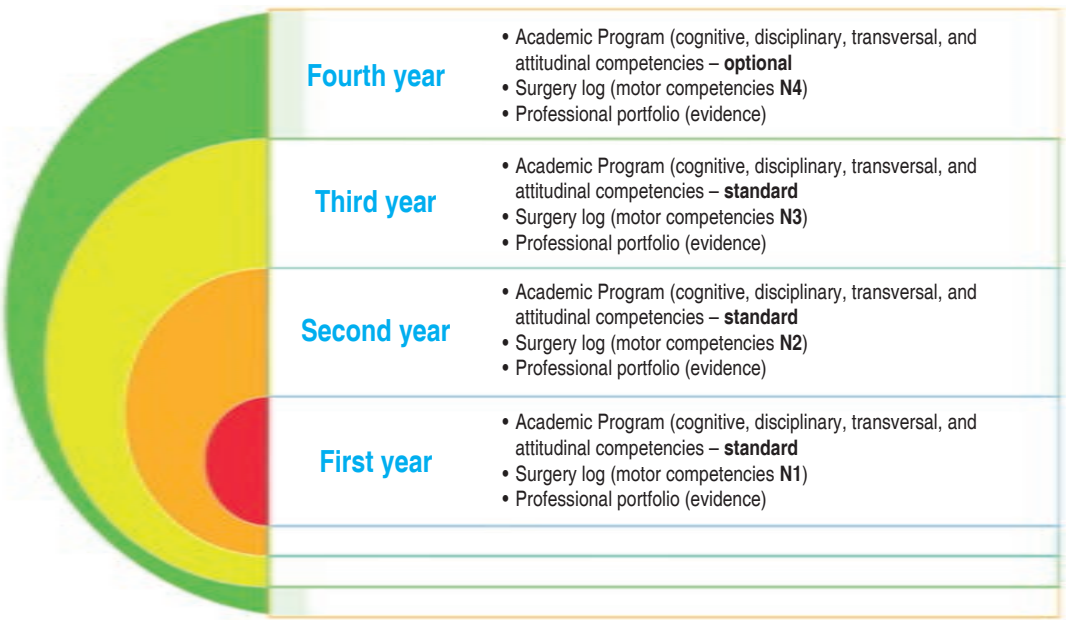

Figure 1:

Calendarized structure of the PRFCG with standard competencies in the first three years and optional competencies in the fourth year.

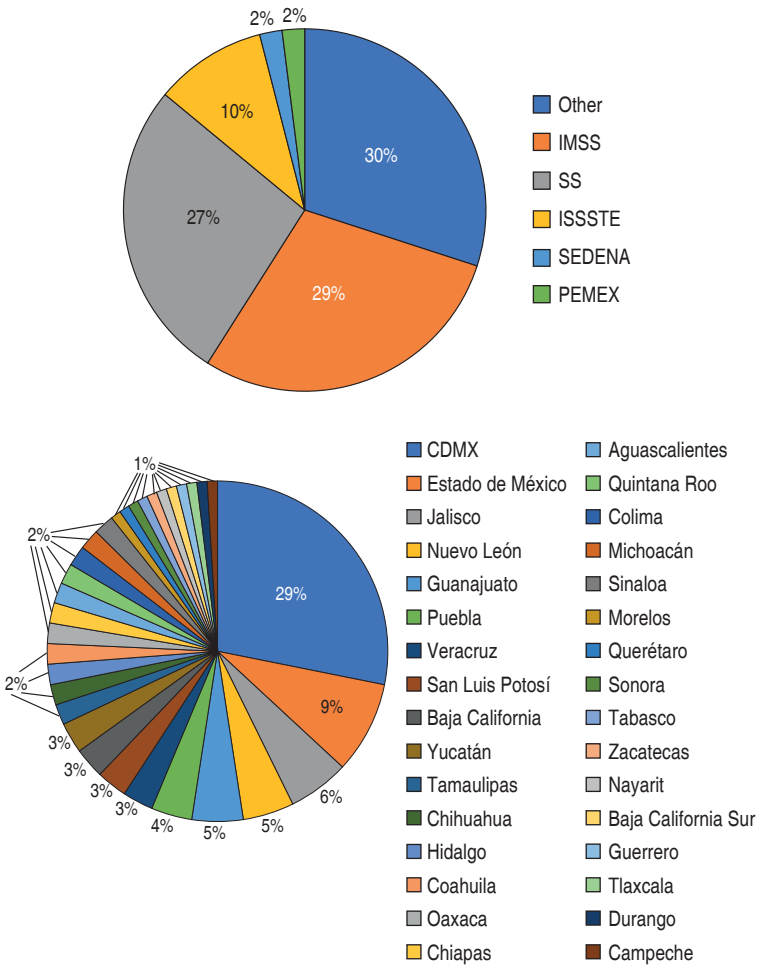

Figure 2: *Federal representativeness and according to the health care sector of the surgeons associated with the AMCG who answered the survey.*

b.1. Recommended procedure log at a minimum (P_{25}).
b.2. Recommended log of procedures as satisfactory (P_{50}).
b.3. Recommended procedure log as ideal (P_{95}).
b.4. Recommended procedure log as a total (P_{100}).

c. ***Attitudinal*** competencies.
c.1. Priority decision-making in the polytraumatized patient (ATLS).
c.2. Safety systems in surgical environments.
c.3. Performance and care of ostomies in the Intensive Care Unit (ICU), emergency department, and hospitalization.
c.4. Laparoscopic skills (FLS or analogous).

d. Basic.
e. Advanced.
e.1. Basic skills of microsurgery.
e.2. Patient safety in complex situations in different surgical environments.
e.3. Basic and advanced endoscopic skills (FES or analogous).
e.4. Effective interactions with other clinical and surgical healthcare team members.

2. ***Transversal*** competencies (not exclusive to the specialty or area of knowledge, but essential for the practice of the discipline).
a. Surgical epidemiology and public health.
b. Surgical research.
c. Surgical ethics.
d. Medical education and teaching.
e. Professionalism and communication.
f. Systems-based learning.
g. Legal aspects of surgical practice.
h. Economics and financial aspects for the surgeon general.
i. Basic concepts of hospital and equipment management.

3. Professional portfolio (evidence that proves the acquisition of the different competencies that integrate the program).
a. Cognitive or theoretical competencies.
b. Transversal competencies.
c. Attitudinal competencies.
d. Motor or procedural competencies.
e. Disciplinary competencies or rotations.
f. Entrustable Professional Activities (APROC) or Entrustable Professional Activities (EPA).
f.1. Inguinal hernia.
f.2. Appendicitis.
f.3. Cholecystitis.
f.4. Trauma.
f.5. General surgery consultation.

The complete details and contents of each of the competencies (cognitive, transversal, attitudinal, motor, and disciplinary), as well as the resident's professional portfolio, can be requested from the general coordinator of the meeting.

The authors authorize the unrestricted use of this information for academic purposes only.

CONCLUSIONS

The purpose of the XVIII National Meeting of the Surgeon AMCG 2022 was to structure and generate a curricular program that will serve as a reference for all the programs and centers that train specialists in general surgery in our country. The product of the working groups can be summarized in four competencies (cognitive, procedural, or motor, attitudinal, and transversal), as well as a professional portfolio of evidence of these integrated competencies. This academic program can be adjusted to educational and hospital levels and infrastructures. The primary intention is to try to "standardize" the minimum theoretical elements necessary for any medical specialist who wants to train in the specialty of general surgery by serving as a "reference" of the plans that must be covered before graduation to have an equitable national competitiveness in all the federal entities and academic centers. The mission of this work was not to impose a program, but to facilitate, through different means and programs, a surgical education of the highest quality for all Mexicans with the support of the AMCG.

ACKNOWLEDGMENTS

The authors would like to acknowledge and sincerely thank the participation of all the expert surgeons and professors from different parts of the country who actively participated in the working tables of the XVIII National Meeting of the Surgeon 2022:

Presidents
Miguel Francisco Herrera Hernández, MD, President of the Mexican Association of General Surgery.
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Hugo Sánchez Aguilar, MD, Professional Electronic Portfolio and Video Library.

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As well as to all the associate members of the AMCG who answered the survey, to the directors and administrative staff of the same association, who allowed and helped in the final realization of this great project.

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Ethical considerations and responsibility: data privacy. According to the protocols established in our work center, we declare that we have followed the protocols on patient data privacy and preserved their anonymity.

Funding: no financial support was received for the preparation of this work.

Disclosure: none of the authors have a conflict of interests in the conduct of this study.

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ORIGINAL ARTICLE
doi: 10.35366/111508

Cirujano General
April-June 2023
Vol. 45, no. 2 / p. 76-81

Gastrointestinal stromal tumors: experience in an oncology unit

Tumores del estroma gastrointestinal: experiencia en una Unidad de Oncología

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Keywords: gastrointestinal stromal tumor, stromal tumor, KIT protein, gastrointestinal tract, treatment.

Palabras clave: *tumor del estroma gastrointestinal, tumor estromal, proteína KIT, tubo digestivo, tratamiento.*

ABSTRACT

Introduction: gastrointestinal stromal tumors are the most common mesenchymal tumors and can occur in any part of the digestive tract. **Objective:** to present the 10-year experience in the Oncology Unit of the General Hospital of Puebla "Dr. Eduardo Vázquez Navarro" in managing patients diagnosed with gastrointestinal stromal tumors. **Material and methods:** a longitudinal, retrospective, observational, and clinical study carried out in patients with histopathological diagnosis of gastrointestinal stromal tumors between January 2012 and December 2022 in the Oncology Unit of the General Hospital of Puebla es presented. **Discussion:** 24 files of patients with a diagnosis of gastrointestinal stromal tumor were reviewed. An institutional incidence of 2% was observed. The average age at diagnosis was 53 years, with a male predominance. Surgical treatment was performed in 96% of the cases. A five-year survival of 16% was found, and recurrence was present in 16% of the liver and lungs. **Conclusions:** gastrointestinal stromal tumors have unpredictable behavior. Surgery in the early stages is the curative treatment. Their indolent presentation makes their diagnosis difficult until the advanced stages of the disease. Tyrosine kinase inhibitors have improved survival and are a therapeutic option in cases where surgery is impossible.

RESUMEN

Introducción: *los tumores del estroma gastrointestinal son los tumores mesenquimales más comunes y pueden presentarse en cualquier parte del tracto digestivo.* ***Objetivo:*** *exponer la experiencia de 10 años en la Unidad de Oncología del Hospital General de Puebla "Dr. Eduardo Vázquez Navarro" en el manejo de pacientes con diagnóstico de tumores del estroma gastrointestinal.* ***Material y métodos:*** *estudio longitudinal, retrospectivo, observacional y clínico efectuado en pacientes con diagnóstico histopatológico de tumores del estroma gastrointestinal entre los meses de enero 2012 y diciembre 2022 en la Unidad de Oncología del Hospital General de Puebla.* ***Discusión:*** *se revisaron 24 expedientes de pacientes con diagnóstico de tumor del estroma gastrointestinal. Se observó una incidencia institucional de 2%. El promedio de edad al momento del diagnóstico fue de 53 años, con predominio masculino. Se realizó tratamiento quirúrgico en 96% de los casos. Se encontró una supervivencia a cinco años de 16% y se presentó recurrencia de 16% en hígado y pulmón.* ***Conclusiones:*** *los tumores del estroma gastrointestinal tienen un comportamiento impredecible. La cirugía en etapas tempranas es el tratamiento curativo. Su presentación indolente dificulta su diagnóstico hasta etapas avanzadas de la enfermedad. Los inhibidores de tirosina cinasa han mejorado la supervivencia y son una opción terapéutica en casos en los que no es posible realizar la cirugía.*

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Received: 03/08/2023
Accepted: 05/02/2023

INTRODUCTION

Gastrointestinal stromal tumors were described under this term starting in 1983 and recognized as a heterogeneous gastrointestinal tumor entity; this term was used to refer to this group of neoplasms of mesenchymal origin.[1] This type of tumor represents 1% of the neoplasms of the gastrointestinal tract, with an approximate

How to cite: Pinedo-Vega ÁD, Orea-Estudillo D, Alquicira-Alcántara E, Pérez-Soriano A, Flores-Huerta FF, González-Xicoténcatl J, et al. Gastrointestinal stromal tumors: experience in an oncology unit. Cir Gen. 2023; 45 (2): 76-81. https://dx.doi.org/10.35366/111508

incidence of 20 cases per million inhabitants.[2] It occurs most frequently between 50 and 60 years of age with no predominance of either sex. This tumor can affect any portion of the digestive tract, and its specific distribution corresponds to 70% gastric, 25% small intestine, 5% colon and rectum, and 2% esophageal.[3] While most gastrointestinal stromal tumors (GIST) are sporadic, there are reports of association with familial syndromes.[4] Their behavior can be benign or even metastatic during diagnosis. There are multiple options for diagnosis, such as computed tomography or magnetic resonance imaging; however, the gold standard is identifying the KIT protein (CD 117) in immunohistochemistry, present in this type of tumor in up to 60-70%. The standard treatment of a GIST without metastasis is complete surgical resection. In the advanced stages of the disease, targeted therapy with protein kinase inhibitors has improved the survival and management of this type of tumor and reduced its recurrence.

MATERIAL AND METHODS

A longitudinal, retrospective, observational, and clinical study was conducted in patients with histopathological diagnosis of GIST treated between January 2012 and December 2022 in the Oncology Unit of the General Hospital of Puebla. The information was obtained based on medical records, evolution notes, surgical records, histopathological reports, and immunohistochemistry tests.

The variables analyzed were incidence, the average age at diagnosis, most frequent symptoms, the diagnostic method used, location, mitotic index, immunohistochemistry, type of surgery performed, survival, and recurrence.

For data management, means between independent groups were recorded, and a parametric statistical test was applied. Categorical variables are reported in frequency and percentages.

RESULTS

Twenty-four files with a diagnosis of GIST confirmed by histopathology and immunohistochemistry were reviewed. During the study period, 1,169 patients diagnosed with gastrointestinal tract neoplasia were attended. The institutional incidence of GIST currently corresponds to 2%.

In the study period, the highest incidence was found in 2022, with five cases, 20.8% in relative terms, 16.6% of patients in 2018 and 2021 for each year, and 12.5% in 2016 and 2017. There was no record of cases in 2019, and in the remaining periods, there was only one diagnosed case *(Figure 1)*.

As a numerical variable, a descriptive statistical analysis was performed. The mean age at diagnosis was 53.2 years. The age range was from 35 years to 75 years at its upper limit. The most frequent age of presentation was 56 years, with five cases presented, which coincided with the statistical median and was also close to the average age. The standard deviation was 11.26 years. The second peak was 36 years, with four cases *(Figure 2)*.

Skewness and kurtosis were analyzed when trying to find a normal distribution behavior in the data because $n < 30$. In the case of the skewness coefficient, a value of -0.13 was obtained, which, although it tends to zero, being less than zero indicates a slight bias of the data to the right, while the kurtosis was -0.85, being negative, in which case the distribution was platykurtic.

A higher incidence was detected in the male sex, with 15 cases versus nine cases in the female sex.

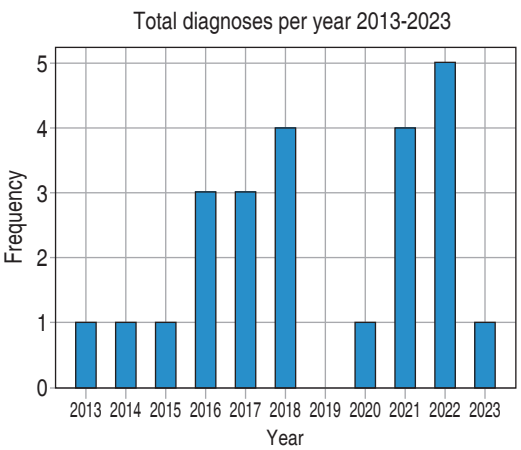

Figure 1: *Annual incidence during the study period.*

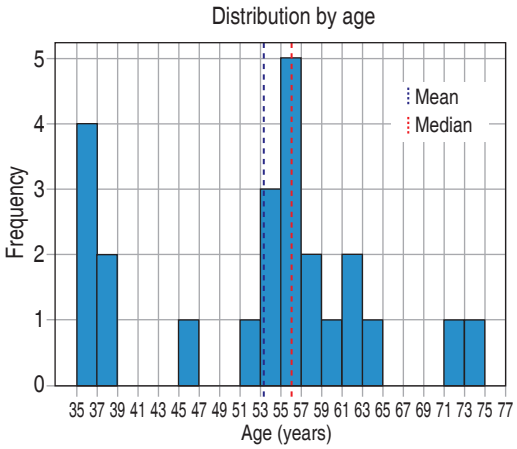

Figure 2: *Frequency and age at diagnosis.*

It was observed that 58% started with symptoms compatible with abdominal pain and weight loss; 25% began with an episode of intestinal occlusion in the emergency department. Only 12.5% presented data of lower gastrointestinal tract bleeding as the only clinical reference *(Figure 3)*.

Regarding the diagnostic method, histopathologic findings after surgical resection were more frequent in 45% of the cases. In the second place, the diagnosis was made by endoscopy in 33% of the patients. It was only identified as a tomographic finding in 20% of the cases.

The tumor location in this series was observed to be more significant in the small intestine, with 66%. Gastric GIST was present in 29% of the cases and the sigmoid colon in 4%, without manifesting in any other digestive tract region *(Figure 4)*.

The most frequent mitotic index in this series of cases was low (one to two in 50 fields) at 58%, while at 29%, a high mitotic index was found (> 5 in 20 areas). In turn, 8% showed no mitosis in the histopathologic study.

Immunohistochemistry revealed the presence of KIT protein (CD 117) in 100% of the cases studied; other markers such as CD34 were detected in 54% of the patients, while discovered on gastrointestinal stromal tumor 1 (DOG1) was only reported in 4% *(Table 1)*.

The patients received surgical treatment in 96% of the cases; 58% underwent intestinal resection of the tumor segment and entero-entero-terminal anastomosis. For gastric location, total gastrectomy with esophageal-jejunum anastomosis was performed. Of the patients, 4% did not seek treatment after diagnosis *(Figure 5)*.

Five-year survival was present in 16% of the cases. Of the patients, 41% are still being followed up. Survival of less than five years was observed in 41% of the patients.

There was recurrence in 16% of cases with tumor activity in the liver and lung.

DISCUSSION

Gastrointestinal stromal tumor (GIST) refers to mesenchymal tumors of the gastrointestinal

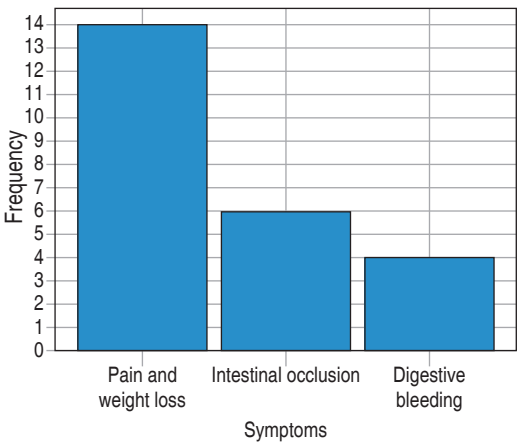

Figure 3: *Frequency of symptomatology presented.*

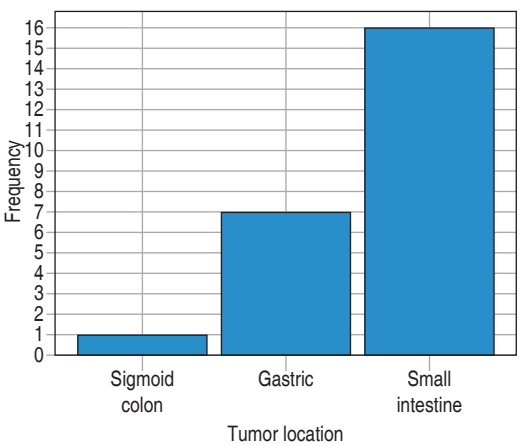

Figure 4: *Most frequent tumor location.*

tract originating from the interstitial cells of Cajal.

The cells of Cajal are a cell lineage of the intestinal stroma located between the longitudinal and circular muscle layers. They are related to the coordination and control of intestinal motility.[5] In GIST, the literature mentions an approximate incidence of 0.3-2% of gastrointestinal tumors,[6] of which corresponds to that found in the oncology unit. Although the literature describes a 1:1 female-to-male ratio, some studies suggest a higher tendency in the male sex.[7] Regarding this series, it was observed that most cases (66.6%) corresponded to men compared to 37.5% in the female sex. In absolute terms, the difference is not very significant since it barely reached a range of six cases per sex. Some studies reveal an equiprobable incidence; however, a greater tendency has been reported in the male sex.[8] According to the literature, the age of presentation ranges between 60 and 69 years,[9] and there are even reports of cases in children; however, in this review, the highest peak was found at 56 years, which corresponds to the average age (interval 35-75 years), despite this, the second peak at 36 years (16%) is under study.

GIST can appear in any part of the gastrointestinal tract, from the esophagus to the rectum, and there are even reports of extraintestinal locations such as the mesentery, omentum, or retroperitoneum. Despite its wide distribution, 50-60% occur in the stomach, 20-30% in the small intestine, 5% in the esophagus, and 5% in the rest of the abdominal cavity. Something worth mentioning in this series is that the highest incidence in its location is intestinal, with 66% in comparison with the gastric area found in 29% and its comparison with what is described in the literature. It is considered that even despite the size, mitotic index, and age of the patient, the location is an important prognostic factor since tumors originating in the small intestine, rectum, or mesentery are associated with a less favorable outcome than those arising in the stomach.[10]

Table 1: Immunohistochemical patterns.

Patients	Immunohistochemical pattern
13	CD 117 (+) CD34 (+), CK 20 (-)
9	CD 117 (+) CD34 (-), CK 20 (-)
1	CD 117 (+) DOG1 (+) CD34 (-) Cytokeratin (-)

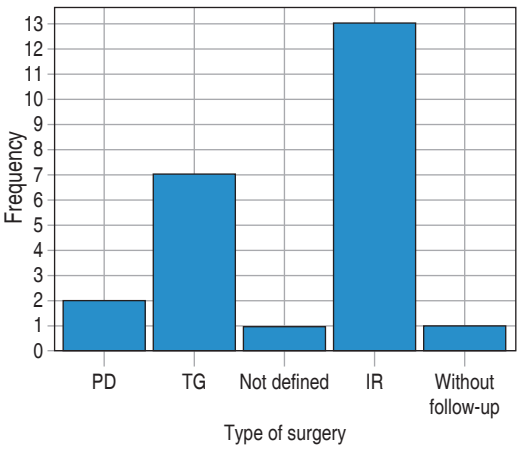

Figure 5: *Type of surgery performed and its frequency. IR = intestinal resection. TG = total gastrectomy. PD = partial duodenectomy.*

Regarding its clinical presentation, it is reported that a high percentage remains asymptomatic until it is observed as a finding at the time of a study. In symptomatic patients, the manifestations are usually non-specific and erratic and correspond to 70% of patients with this type of tumor.[11] Gastrointestinal tract bleeding is the most frequent symptom, followed by abdominal pain, weight loss, and a palpable mass. In this series, the most frequent symptom was non-specific abdominal pain and weight loss (58%), followed by episodes of intestinal occlusion (25%) and, finally, gastrointestinal tract bleeding (12.5%).

Histologically, GIST is described as a tissue consisting of cells with morphology described in one of three categories: spindle cells, epithelioid, and mixed type.[12] By the early 1990s, there was confusion regarding the lines of differentiation shown in this type of tumor; thanks to studies performed around mutations in the KIT protein and its expression, this field was transformed concerning tumor diagnosis.[13] KIT is a receptor tyrosine kinase type III. It presents its activation with stem cell factor binding with subsequent activation of

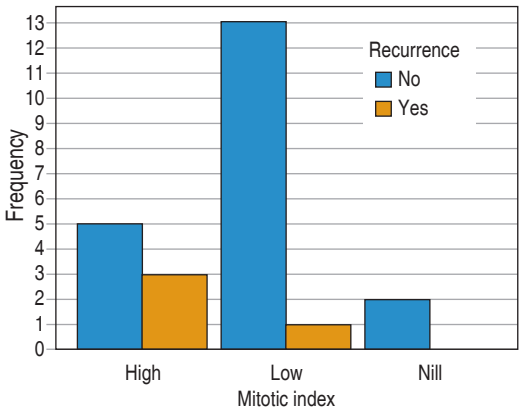

Figure 6: *Relationship between mitotic index and recurrence.*

signal transduction pathways resulting in cell proliferation, differentiation, maturation, and survival, showing its derivation from Cajal's interstitial cells.[14] Because of this, it was determined that a characteristic of GISTs is the expression of CD 117 (KIT) in 90-95% of cases, followed by CD34 in 60-70%. In this series, positivity for CD 117 was found in 100% of cases, followed by CD34 in 54% and only 4% for DOG1 *(Table 1)*.

Due to the no specificity of the clinical picture, approximately 50% of patients have metastases at the time of diagnosis. Diagnostic imaging methods include computed tomography scan, magnetic resonance imaging, PET scan (positron emission tomography), and ultrasound. Of these, tomography is the most useful and has the advantage of showing invasion and metastasis.[15] In this review, it was observed that 45% were histopathologically diagnosed after tumor resection, while 30% obtained a pre-surgical histopathological diagnosis by endoscopy and only 20% by tomographic findings.

GIST has an uncertain malignant potential. In conjunction with tumor diameter, the mitotic index has been used to stratify the risk of recurrence in this type of tumor. Reports indicate that a mitotic index higher than five mitoses/50 fields (high) has a recurrence risk of 86%.[9] At the same time, indexes lower than five mitoses/50 fields (low) are reported with a recurrence risk of 11%. This study found a low mitotic index of 58% and a high index of 29% *(Figure 6)*. The most common sites of recurrence are the liver (65%), peritoneum (50%), and both (20%). This study detected recurrence in 16%, with tumor activity in the liver and lung.[16] Of this group of patients, 75% presented a high mitotic index, while 25% showed a low mitotic index.

Treatment is dependent on size, location, and dissemination. Surgery is considered the initial treatment, which is the gold standard with complete resection in the early stages and a curative potential if negative margins are achieved.[17] Regional lymph node dissection is of little value due to the absence of metastases at this level. In the case of unresectable disease, which is reported in the United States between 13 and 50%,[18] or if there is a high risk of recurrence, the use of tyrosine kinase inhibitors (imatinib, sunitinib, regorafenib) is used as medical treatment. This type of drug is considered the standard treatment in metastatic disease.[19] It responds poorly to chemotherapy, while radiotherapy is only used for analgesic purposes or in case of intraperitoneal bleeding.

CONCLUSIONS

Gastrointestinal stromal tumors have unpredictable behavior. Due to the low relative frequency of GIST, it is essential to consider it among the diagnostic alternatives for abdominal tumors for the most suitable treatment possible. Although surgery is regarded as the curative treatment for this type of tumor, the risk of detecting it in advanced stages is high due to the insidiousness of the clinical presentation. Applying the KIT protein (CD 117) as a diagnostic marker and even as a therapeutic target using tyrosine kinase inhibitor drugs has improved survival in these patients.[20] Close long-term follow-up is essential because of the high risk of recurrence. Studies in more extensive series of GIST are required to clarify etiological and risk factors, as in this study in which the highest frequency was observed in the male gender or the presentation of the tumor was detected at an early age.

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Ethical considerations and responsibility: data privacy. According to the protocols established in our work center, we declare that we have followed the protocols on patient data privacy and preserved their anonymity.

Funding: no financial support was received for the preparation of this work.

Disclosure: none of the authors have a conflict of interest in the conduct of this study.

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ORIGINAL ARTICLE
doi: 10.35366/111509

Cirujano General
April-June 2023
Vol. 45, no. 2 / p. 82-92

Criteria for admission to the third stage of damage control surgery in abdominal trauma at the General Hospital of Queretaro

Criterios para ingreso a la tercera etapa de cirugía de control de daños en trauma abdominal en el Hospital General de Querétaro

Rodolfo Muñoz-Chávez,* María del Carmen Aburto-Fernández,* Andrés Baca-Hernández‡

Keywords:
damage control surgery, lethal triad, second stage.

Palabras clave:
cirugía de control de daños, triada letal, segunda etapa.

ABSTRACT

Introduction: damage control surgery refers to the rapid completion of surgery after controlling life-threatening bleeding and avoiding contamination, and then to correcting physiological abnormalities and definitive management to avoid the lethal triad. **Objective:** to determine the clinical and laboratory parameters and Intensive Care Unit stay most frequently used for admission to the third stage in damage control surgery. **Material and methods:** in a retrospective observational study, 30 files of patients who underwent damage control surgery at the General Hospital of Queretaro were analyzed, taking as variables pH, number of blood transfusions, coagulation times, temperature, Intensive Care Unit stay, and hemoglobin. **Results:** 80% male population, mean age of 43.5 years, Intensive Care Unit stay of 41 hours, mean hemoglobin of 12 g/dl when entering the third stage of damage control surgery, mean temperature of 36.56 degrees, pH of 7.33 and mean number of transfusions of 3.3 globular packets. **Conclusions:** with the present report, we place in an international panorama of our performance in the second stage of damage control surgery, in which we can undoubtedly improve to offer better results to our patients in the short, medium, and long term.

RESUMEN

Introducción: *la cirugía de control de daños se refiere a la culminación rápida de una cirugía después de controlar el sangrado que puede amenazar la vida y evitar la contaminación para luego llegar a la corrección de las anormalidades fisiológicas y manejo definitivo, encaminado a evitar la tríada letal.* ***Objetivo:*** *determinar los parámetros clínicos, laboratoriales y estancia en Unidad de Cuidados Intensivos (UCI) que se utilizarán con mayor frecuencia para el ingreso a la tercera etapa en la cirugía de control de daños.* ***Material y métodos:*** *estudio retrospectivo observacional. Se analizaron 30 expedientes de pacientes sometidos a cirugía de control de daños en el Hospital General de Querétaro, teniendo como variables: pH, número de transfusiones sanguíneas, tiempos de coagulación, temperatura, estancia en UCI y hemoglobina.* ***Resultados:*** *80% población masculina, edad media de 43.5 años, estancia en Unidad de Cuidados Intensivos de 41 horas, hemoglobina promedio de 12 g/dl al entrar a tercera etapa de cirugía de control de daños, temperatura media de 36.56 grados, pH de 7.33 y una media de transfusiones de 3.3 paquetes globulares.* ***Conclusiones:*** *con el presente estudio ubicamos en un panorama internacional nuestro actuar en la segunda etapa de cirugía de control de daños, en la que podemos mejorar indudablemente para así ofrecer mejores resultados a nuestros pacientes a corto, mediano y largo plazo.*

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Received: 08/04/2022
Accepted: 05/02/2023

INTRODUCTION

Damage control surgery refers to the rapid completion of surgery after control of life-threatening bleeding and avoidance of contamination, followed by correction of physiological abnormalities and definitive management, aimed at avoiding the lethal triad *(Figure 1)*.[1,2]

The term "damage control", used in the naval navy, means "the ability of a military ship to absorb damage and continue with

How to cite: Muñoz-Chávez R, Aburto-Fernández MC, Baca-Hernández A. Criteria for admission to the third stage of damage control surgery in abdominal trauma at the General Hospital of Queretaro. Cir Gen. 2023; 45 (2): 82-92. https://dx.doi.org/10.35366/111509

the mission", hence the term damage control surgery and damage control resuscitation.[3,4]

It has been shown that combining both methods of damage control results in an approximate survival of 60 to 90% compared to using these methods separately at 58%. Feliciano also demonstrated a 90% survival in his research series.[5,6]

Traditional surgical dogma dictates that an operation be completed definitively, regardless of the patient's physiological condition. In wartime, battlefield casualties suffered exsanguinating injuries and underwent amputations for over 100 years, causing one-third of the reported 6 million trauma deaths annually.[7,8]

Pringle described hepatic hilum compression for severe liver injury, digital compression of the portal triad, and packing to stop massive hemorrhage in 1908. Halsted modified this technique by placing rubber sheets to pack and protect the hepatic parenchyma; these perihepatic packings have been reported since the 1970s and 1980s.[9,10]

Lucas and Ledgerwood, in 1976, at Detroit Hospital, reported three packings in 637 liver lesions. Feliciano reported in the 1980s 90% survival in 10 patients with severe liver lesions that were packed.[3]

Historical background

The modern concept of abbreviated laparotomy was described by Stone in 1983, and the term "damage control" was coined in 1993 by Schwab in Philadelphia. It refers to rapid initial control of hemorrhage and contamination, temporary abdominal closure, Intensive Care Unit (ICU) resuscitation, and subsequent re-laparotomy with definitive repair.[3,7] It was a term popularized by Rotondo in 1990. A modern review by Shapiro identified that this technique had been used in 1,000 patients with abdominal trauma.[11]

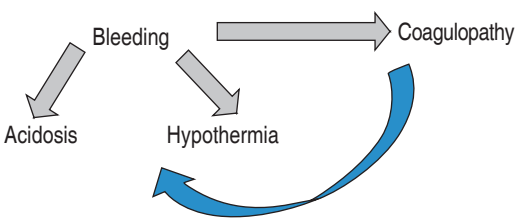

Figure 1: *Vicious circle of the lethal triad.*

The 1970s and 1980s also saw the widespread use of ICUs based on clinical resuscitation managing acute respiratory distress syndrome (ARDS), systemic inflammatory response syndrome (SIRS), and multiple organ failure (MOF) avoiding early death during post-surgery, an alternative sought by trauma surgeons in the 1980s identifying the lethal triad, and the definitive definition of damage control surgery as it is known today. The management of patients with an injury severity score of at least 30 points with orthodox surgery carried a mortality of over 70%. It was with damage control surgery (DCS) in the 1990s that mortality was reduced to 58-67%, to 33% in 2001, and 10-27% by 2006.[7,10]

Baker, in 1974 created a method to describe the patient with multiple injuries and evaluate the emergency, called ISS (Injury Severity Score). The score is the sum of the highest scores of the three most affected body regions, obtaining a critical index. Tornetta highlights the importance of the ISS score as a prognostic factor for mortality; a score of 0 to 18 represents less than 5% mortality. From 19 to 30, the mortality is 30%, and more than 30 points 45%.[1]

Pathophysiology

The presence of coagulopathy, hypothermia, and metabolic acidosis, the "deadly triad", was first described by Burch in 1992.[12] In a severely injured patient, it carries a mortality risk of up to 90%.[7] Uncontrolled bleeding and iatrogenic intravenous therapy result in the development of the lethal triad, leading to a vicious cycle that rapidly triggers death.[13]

The presence of coagulopathy is associated with a 28-46% mortality.[12] Intense and rapid resuscitation with intravenous fluids leads to dilution of coagulation factors, which affects the coagulation cascade and may cause consumption of coagulation factors, triggering disseminated intravascular coagulation (DIC). Intravascular hydrostatic pressure increases, displacing fluid, platelets,

and blood into the extravascular space, aggravating DIC. An imbalance between thromboxane and prostacyclin leads to dysfunction of the fibrinolytic system and platelet dysfunction.[14]

Hypothermia is a body temperature of 35 ºC or less for more than four hours[15] and can result in hypotension, cardiac arrhythmias, and hematologic, respiratory, renal, and endocrine disturbances. It is secondary to fluid loss from trauma, intense resuscitation with intravenous fluids and total body exposure as defined by the ATLS detailed review. It also occurs in surgery with extensive incisions that cause evaporation of intraperitoneal fluid from exposed surfaces.[16,17]

Hypothermia is a phenomenon observed in more than two-thirds of trauma patients. Its effect on mortality was first observed in cases with ruptured abdominal aortic aneurysm, being 91-100% in patients with a temperature below 32 ºC and 40-60% in those with a temperature of 32-35 ºC.[7] Mortality increases by 10% if the temperature falls below 34º C.[18] The main effects of hypothermia are:

1. Decreased cardiac output.
2. Decreased heart rate.
3. Increased peripheral vascular resistance.
4. Arrhythmias such as sinus bradycardia.
5. Decreased glomerular filtration rate.
6. Decreased Na+ absorption in renal tubules.
7. Depression of the central nervous system (CNS).
8. Decreased fibrinolytic activity (coagulopathy).

Acidosis is an indicator of tissue hypoxia produced by ischemia and necrosis.[14] Acidosis is metabolic and occurs due to lactate production and anaerobic metabolism. If the acid-base defect is not corrected in at least 48 hours, mortality is as high as 86-100%.[19] By driving anaerobic metabolism and the synthesis of lactic acid and other cytotoxic substances, increased lactate correlates with injury severity, and even base deficit can be used as a marker of injury severity and a predictor of transfusion requirements. Aortic clamping, vasopressors, massive transfusions, impaired myocardial performance, and resuscitation with large volumes of crystalloids may exacerbate metabolic acidosis in the shock state. If lactic metabolic acidosis is not corrected, it has a 45-67% mortality rate.[20]

The organic effects are listed below:

1. Decreased myocardial contractility.
2. Decreased inotropism.
3. Decreased response to catecholamines.
4. Ventricular arrhythmias.
5. Increased intracranial pressure (ICP).
6. Prolongation of partial thromboplastin time (PTT).
7. Decreased activity of factor V of coagulation.

Indications for damage control surgery

A. Physiological critical factors: demonstrated hypothermia, demonstrated acidosis, with base deficit > 8, coagulopathy demonstrated by PT (prothrombin time) lengthening, thrombocytopenia, massive transfusion requirements (more than ten globular units), time to repair exceeding 90 minutes, hemodynamic instability, with frank data of tissue hypoperfusion.[21]
B. Complex associated injuries to the primary trauma: high energy blunt trauma with thoracic involvement, multiple penetrating chest injuries, severe abdominal trauma, with major vascular trauma in the same patient.[22]
C. Other considerations: lesions that can be repaired more effectively, such as with angiographic embolization, elderly patients, or those with other comorbidities.[23-25]

Damage control surgery approach strategy

The initial management of trauma patients is based on the principles of the ATLS course. A systematic patient assessment focused on treating life-threatening injuries leads to patients who present with surgically correctable injuries being taken to the operating room immediately.[26] The selection of patients who would benefit from damage control surgery is based on a large constellation of injuries as well as

the physical condition of the patient, the best candidates being those with extensive injuries requiring long operative time, hemodynamic instability, and significant exsanguinating injuries.[27,28]

The strategy of the method for damage control surgery is divided into several stages. Mainly three stages are described; some authors describe four and even five stages, taking the convalescence and the definitive reconstruction of the abdominal wall,[29] as this last stage of the strategy.

Stage I

This stage goes from pre-hospital management, also called stage 0, until the patient is admitted to the operating room and the decision is made to perform damage control surgery, and this is concluded.[30] The abdominal injuries that most frequently require management with damage control surgery are severe hepatic injuries up to 83%, being more common grade III injury[31] and splenic and renal injuries. For injuries that can be repaired, the Pringle maneuver is indicated for up to 60 minutes without representing parenchymal ischemia that affects liver function.[32] The primary method for complex abdominal liver injuries is packing.[33,34] Packing the liver is performed using a laparotomy and placing compresses at the site of origin of the hemorrhage when the retro hepatic vena cava is injured; packing is performed anteriorly by compressing the vena cava completely. Other parenchymal injuries require anterior and posterior packing; the goal is to buffer the bleeding site without suppressing the blood flow of the hepatic parenchyma. Plastic sheets can be placed over the parenchyma and then packed with compresses to avoid removing clots when the packing is removed.[35,36] Packing is the most commonly used method in the management of significant liver injuries; the indications for packing are the treatment of the liver injury due to the extent of other intra-abdominal injuries, the presence of coagulopathy related to deep shock, or the "irreparable" nature of the liver injury.[26,37,38] Judicious use of packing in highly selected patients provides 60-90% survival. Feliciano demonstrated 90% survival in the 1980s in liver packing.[39] Hepatic hemorrhage may persist in case of misapplication of compresses around the liver or due to irregularities in the wound (as occur in blunt trauma). In addition, packing is associated with some complications, such as the development of biliary fistulas, biliomas, and hepatic abscesses.[16,20]

Once the hemorrhage and peritoneal contamination have been controlled, the abdomen should be temporarily closed. For this, field clamps, mesh, plastic bags, the "Bogotá bag", aponeurosis closure, plastic or silicone sheets and vacuum packing, and Velcro-glued sheets, which provide a tension-free and impermeable cover of the abdominal contents to prevent fluid loss and evisceration, can be used.[16]

Stage II

The second stage, also called resuscitation, goes from the conclusion of the surgical event and the patient's admission to the ICU for physiological stabilization until the decision to perform the definitive laparotomy. Today this stage is also known as damage control resuscitation.[20]

The first measure of physiological correction should be the recovery of body temperature in an insulated room with constant temperature, warm solutions, and warm or thermal covers that maintain the heat.[40]

Acidosis must then be corrected, achieved by improving oxygen demand and ensuring tissue perfusion, the determinants of tissue perfusion being cardiac output, hemoglobin, and arterial blood oxygen saturation. Therefore, resuscitation with blood products is ideal, avoiding hyperchloremic acidosis in this type of patient, which increases mortality. Central venous pressure monitoring is the best parameter to assess whether resuscitation is adequate.[39-41]

Adequate resuscitation up to this point helps in the correction of coagulopathy, accompanied by resuscitation with fresh frozen plasmas, cryoprecipitates, and coagulation factors such as factor VII, in

which improvement in coagulopathy has been found for cases undergoing damage control surgery.[39,41]

Stage III

This stage, also known as definitive surgery, must be performed when the patient is out of the lethal triad and without risk of suffering it again, and with stable physiological vital signs, the patient may enter the operating room again for the definitive repair of the lesions and the definitive closure of the abdominal wall, preferably between 24 and 36 hours. This stage does not have a standard time to be performed; however, it is recommended to stay within 72 hours.[39,41] It has been reported that mortality increases by performing it in the first hours after the first surgery. During the definitive procedure, the revision is completed in search of lesions that could have gone unnoticed in the first surgery, the packing is removed, and bleeding sites and the definitive closure of the aponeurosis are controlled.[42]

Stage IV

The concept of delayed closure of the abdominal wall is credited to Stone and collaborators, in 1981, who carried out a study among 167 patients, with an approximate mortality of 85% in those patients whose abdomen was closed under tension, compared to 22% only in those in whom delayed closure was decided.[3] Some modern reviews already describe stage IV resuscitation after definitive surgery and describe stage V as definitive closure; this depends on the literature reviewed and the use in each hospital center.[43]

Complications

The main complications depend on the injury site and the type of repair performed, or systemic complications derived from hemorrhage, massive resuscitation, or local or intra-abdominal infections, up to compartment syndrome.[44] A more significant number of complications and worse postoperative prognosis have been described in morbidly obese patients with body mass index (BMI) > 40.[45]

A review by Rotondo identified an overall mortality of up to 50% and morbidity of 40% in 961 patients undergoing damage control surgery. These reports point to the improved survival of patients with abbreviated surgery compared to a conventional procedure.[46]

Increased mortality was identified in other serious injuries associated with abdominal trauma.[47]

Adequate resuscitation in the first 15 minutes is a risk factor that predicts survival in cases undergoing damage control surgery.[10]

The presence of the lethal triad was associated with increased mortality regardless of the type of trauma.[48]

The abdominal compartment syndrome described by Richardsson in 1976 results from a persistent increase in intra-abdominal pressure (IAP) and can be of two types: primary (caused by abdominal injuries) and secondary (without intraperitoneal injuries). Abdominal trauma is the most frequent cause of primary abdominal compartment syndrome (ACS), mainly if a damage control laparotomy is performed. Factors predisposing these patients to increased IAP are abdominal packing, bleeding from coagulopathy, bowel edema from massive fluid resuscitation, increased bowel volume from mesenteric vascular injury, closure of the aponeurosis and skin under tension, and extensive contamination resulting in abdominal ileus and distention.[49] The incidence of ACS in severe trauma is 14-33% of trauma patients admitted to the ICU.[7,10]

Once ACS has developed, the associated mortality ranges from 63-72%.[7]

"The success of damage control surgery depends on the disciplined approach, which includes surgeon decisions, quick control, and determination."

MATERIAL AND METHODS

A descriptive, retrospective, and observational study that covered the period from January 01, 2015, to June 01, 2018, was done. The group of patients included all those admitted to the General Hospital of Queretaro for intensive care for damage control surgery; the clinical

records of patients were analyzed by collecting the information in data collection tables, and the number of patients who met the following inclusion criteria was determined: patients with clinical records and who had entered intensive care to continue with the third stage of damage control surgery and had completed the surgery.

After determining the number of patients who met the inclusion criteria, the records were carefully reviewed to determine which patients did not meet the criteria 100% by excluding the following:

1. Patients with incomplete registration.
2. Other eventual diseases, such as diabetes and arterial hypertension, affecting all injured patients.
3. Patients under 16 and over 60 years of age.

The total number of variables were identified and analyzed: pH, which is a measure of acidity or alkalinity of a solution, being a numerical quantitative variable; blood transfusions, which are the number of erythrocyte concentrates administered, being a numerical quantitative variable; clotting times, which refers to the time in which clotting is obtained in blood drawn from patients, and is a numerical quantitative; temperature is a measure of heat within a body expressed in degrees, and it is a numerical quantitative variable; Intensive Care Unit stay, which refers to the period in which a patient remains in the Intensive Care Unit, and it is a numerical quantitative variable; hemoglobin, amount of hemoprotein found in the body expressed in g/dl, and it is a numerical quantitative variable.

The information was compiled in data collection tables, and the results were then entered into a database in MS Excel and analyzed using the IBM SSPS 20.0 statistical program to obtain the variables to be considered, representing the results of the research using graphs and correlation tables, in addition to their description in the text.

Descriptive measures of central tendency, such as mode, mean, and median, were performed. Statistical analysis of the results in percentages and averages was performed to determine the frequency.

Descriptive statistics were performed to facilitate the information's management, organization, and analysis.

RESULTS

In the present investigation, 30 patients were analyzed (data collected from clinical records) during the period from January 01, 2015, to June 01, 2018, who underwent damage control surgery at the General Hospital of Queretaro. The following variables were analyzed: pH, number of transfusions, temperature, Intensive Care Unit stay, coagulation time, and hemoglobin. Likewise, data prior to admission to the Intensive Care Unit and before surgery were analyzed, such as hemoglobin levels, temperature, pH, and coagulation times, which yielded the following results throughout the research.

Of the 30 patients analyzed, we found that the gender distribution was 80% male and 20% female.

For the age distribution of the patients who underwent damage control surgery, the mean age was 43.5 years, with a mode of 48 years, as shown in *Figure 2*.

The results show the time in hours the patients were in the Intensive Care Unit, reporting a mean of 41 hours, a mode of 48 hours, and a median of 40 hours.

For hemoglobin levels in patients undergoing damage control surgery, two measurements were taken from the records, one prior to admission to the Intensive Care Unit with a mean of 9.1 mg/dl and mode of 10 mg/dl, and another measurement prior to the second surgical time or admission to the third stage of damage control surgery, finding a mode of 11.8 mg/dl and a mean of 12 mg/dl as shown in *Figure 3*.

Figure 4 shows the coagulation times measured according to the INR (international normalized ratio), of which two measurements were taken, prior to admission to the Intensive Care Unit, with a mean of 1.42 and a mode of 1.3, and prior to the third stage of damage control surgery, with a mean of 1.31 and a mode of 1.3.

For temperature, two measurements were taken prior to admission to the Intensive Care Unit, which gave a mean of 35.8 degrees Celsius and a mode of 36 degrees Celsius, and another measurement prior to admission to the third stage of damage control surgery with a mode of 36.8 degrees Celsius, a mean of 36.5 degrees Celsius and a median of 36.6 degrees Celsius, as shown in *Figure 5*.

In *Figure 6*, we can find the pH with which the patients arrived at the Intensive Care Unit with a mode of 7.2 and a mean of 7.1, and the values obtained prior to admission to the third stage of damage control surgery with a mode of 7.3 and a mean of 7.33.

For the number of blood transfusions, a mean of two units of erythrocyte concentrates and one unit of plasma was observed, with a mode of 3.3 units of erythrocyte concentrates and 2.1 units of plasma, as shown in *Figure 7*.

DISCUSSION

The international literature mentions a high incidence in subjects under 30 years of age, mainly males,[7,50,51] data that partially coincide with the study results in the population group studied, with a mean age of 43.5 years and a mode of age of 48. The most affected age group was observed between 40 and 50 years. Regarding gender, male patients were more affected, with 24 cases representing 80%, and the female gender with six cases corresponding to 20%. This population is highly productive; it should be noted that patients under 16 years of age were eliminated from this population because they are not patients who are routinely admitted to our unit and patients over 60 years of age due to the high frequency of comorbidities.

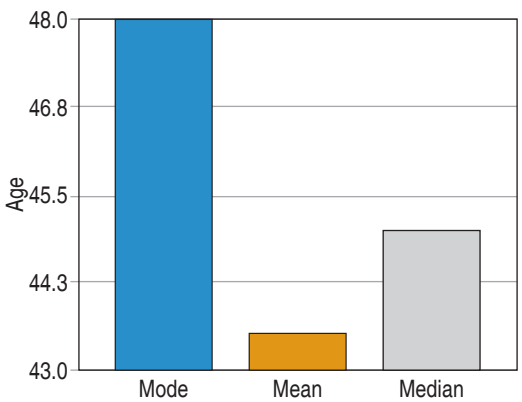

Figure 2: *Age distribution of patients undergoing damage control surgery at the General Hospital of Queretaro.*

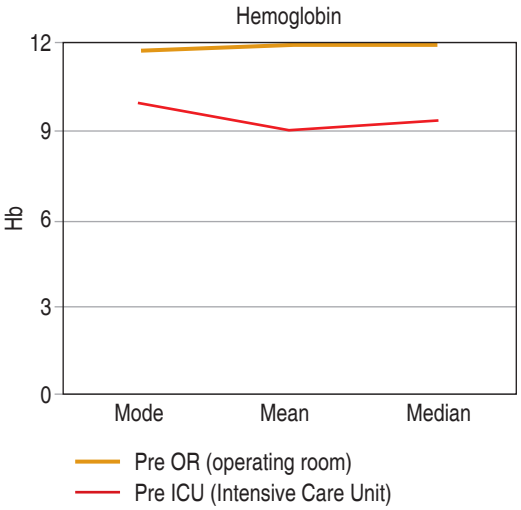

Figure 3: *Hemoglobin levels in patients before admission to the Intensive Care Unit and before the second surgical time, undergoing damage control surgery at the General Hospital of Queretaro.*

Stage III of damage control surgery, also known as definitive surgery, i.e., where the unpacking and final repair is carried out if necessary, which should be performed when the patient is out of the lethal triad and without risk of suffering it again, as well as to perform the definitive closure of the abdominal wall, preferably between 24 and 36 hours[50] this stage does not have a standard time to be performed. However, it is recommended to stay within 72 hours for its realization.[52-54] Concerning this variable is where a mean of 41 hours is obtained to enter the third stage of damage control surgery and a mode of 48 hours, entering international ranges and recommended as the authors mentioned above, compared with Latin American publications is below

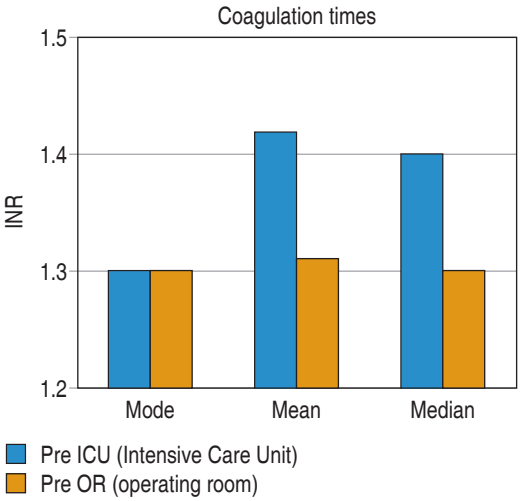

Figure 4: *Coagulation times in patients before admission to the Intensive Care Unit and before the second surgical time, undergoing damage control surgery at the General Hospital of Queretaro.*
INR = international normalized ratio.

the average time of 72 hours (measure that is standardized for entry to the third stage of damage control surgery)[3,7] but when comparing with Canadian and European publications where the length of stay in the Intensive Care Unit is reduced from 12-24 hours, a considerable gap of hours is reflected for the recovery of the patient from the lethal triad.

Coagulopathy is related to a mortality of 28-46%.[1,2] Concerning this point, we found that the patients presented a recovery for the INR (international normalized ratio) with a mean of 1.4 on admission to the Intensive Care Unit and recovery to a mean of 1.3; the same event was observed with the temperature which had a correction since on admission to the Intensive Care Unit it had a mean of 35.8 degrees centigrade and was modified to achieve a mean of 36.5 degrees centigrade. The pH correction benefitted favorably, achieving an average of 7.33 to 7.1, the value with which they entered the Intensive Care Unit. With this, the correction of the lethal triad is seen as the main objective of the second stage of damage control surgery, since with this, we avoid reaching mortality of 90% once this is established and without the possibility of recovery of these parameters.[7]

Concerning the number of transfusions required in the Intensive Care Unit, we have a mean of two red blood cell packs and a mode of 3.3 red blood cell packs to contribute to the correction of the lethal triad, which is not significant because the number of units administered since admission to the emergency department was not counted.

CONCLUSIONS

The action in damage control surgery, specifically in the second stage, consists of the management of the lethal triad in the Intensive Care Unit, where the interventions are aimed at preparing the patient for a definitive but safe intervention for the patient. It is concluded that the indispensable requirements for correcting acidosis, coagulopathy, and hypothermia are met, thus undoubtedly improving the morbimortality of these patients in the short, medium, and long term. Nevertheless, it is also worth mentioning that the stay in this unit is considerably shorter, thus avoiding the possibility of infections both associated

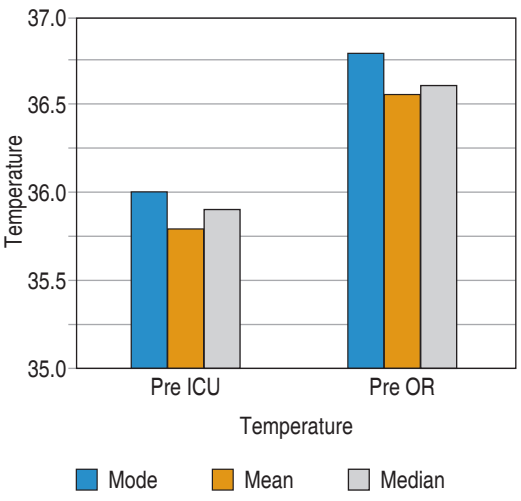

Figure 5: *Temperature in patients before admission to the Intensive Care Unit and before the second surgical time, undergoing damage control surgery at the General Hospital of Queretaro.*

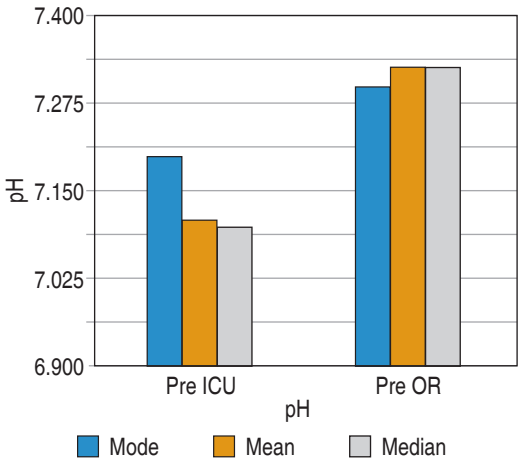

Figure 6: *pH levels in patients before admission to the Intensive Care Unit and before the second surgical time, undergoing damage control surgery at the General Hospital of Queretaro.*

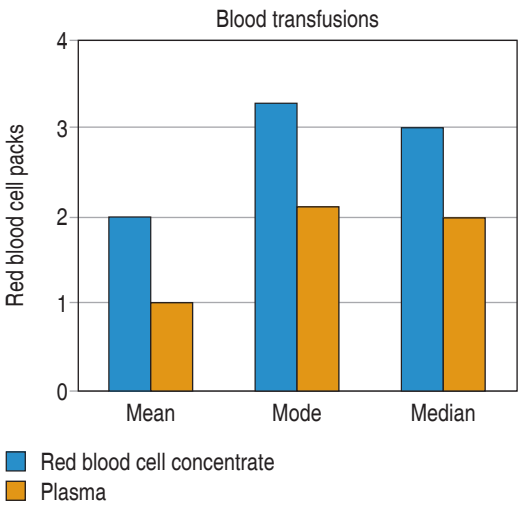

Figure 7: *Number of red blood cell packs transfused to patients undergoing damage control surgery at the General Hospital of Queretaro.*

with mechanical ventilation that these patients require and intra-abdominal and the characteristics of the tissues at the time of definitive surgery, being this study an indicator to alert in possible improvements in our performance in damage control surgery for better results to our patients. This is to optimize times in care and strategies for correcting the lethal triad in trauma patients.

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Ethical considerations and responsibility: data privacy. According to the protocols established in our work center, we declare that we have followed the protocols on patient data privacy and preserved their anonymity.

Funding: no financial support was received for the preparation of this work.

Disclosure: none of the authors have a conflict of interest in the conduct of this study.

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REVIEW ARTICLE
doi: 10.35366/111510

Cirujano General
April-June 2023
Vol. 45, no. 2 / p. 93-98

Morel-Lavallée lesion in burned patients

Lesión de Morel-Lavallée en pacientes quemados

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Keywords:
Morel-Lavallée injury, dissecting hematoma, lumbosacral region, high-energy trauma, burn patient.

Palabras clave:
lesión de Morel-Lavallée, hematoma disecante, región lumbosacra, trauma de alta energía, paciente quemado.

ABSTRACT

Morel-Lavallée injury is a closed traumatic injury that dissects soft tissues in anatomical planes. It is related to high energy mechanisms; it can involve only soft tissues or in combination with fractures. Burn patients may present within the group of traumatic injuries, whose external forces during impact cause separation between anatomical planes. Bibliographic research identifies the most recent publications that describe and treat this injury. It causes disruption of blood vessels and lymphatic vessels in the subcutaneous space overlying the muscle fascia, leading to fluid accumulation in burn patients with extensive surface areas and associated high-energy trauma. It can quickly go unnoticed due to deep burns, edema due to high volumes of crystalloids, and hemoderivatives used in the initial resuscitation phase, adding endothelial capillary leakage. Surgical debridement is the most effective treatment, and less invasive methods have been proposed for better esthetic and functional results; currently, there are few publications on the subject. The approach includes a structured evaluation, investigation of trauma kinematics, a high index of suspicion, and serial reviews.

RESUMEN

La lesión de Morel-Lavallée es una lesión traumática cerrada que diseca los tejidos blandos por planos anatómicos. Está relacionada con mecanismos de alta energía, y puede involucrar únicamente tejidos blandos o en combinación con fracturas. Se encuentra dentro del grupo de lesiones traumáticas que los pacientes quemados pueden presentar, cuyas fuerzas externas durante el impacto causan separación entre planos anatómicos. Mediante una investigación bibliográfica se identifican las publicaciones más recientes que incluyen la descripción y tratamiento de esta lesión. Condiciona interrupción de vasos sanguíneos y vasos linfáticos en el espacio subcutáneo que recubre la fascia muscular, lo que propicia acumulación de líquido en pacientes quemados con superficies extensas y trauma de alta energía asociado. Puede pasar fácilmente inadvertida debido a quemaduras profundizadas, edema por volúmenes altos de cristaloides y hemoderivados utilizados en la fase de reanimación inicial, agregándose fuga capilar endotelial. El desbridamiento quirúrgico es el tratamiento más efectivo, se han propuesto métodos menos invasivos buscando mejores resultados estético-funcionales; actualmente son escasas las publicaciones. El abordaje comprende una evaluación estructurada, investigar la cinemática de trauma, un alto índice de sospecha y revisiones seriadas.

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Received: 03/08/2023
Accepted: 05/02/2023

INTRODUCTION

The Morel-Lavallée lesion (MLL), first described in 1863 by the French surgeon Victor Auguste François Morel-Lavallée, consists of a closed traumatic injury that dissects soft tissues in anatomical planes, may be associated with high energy mechanisms and have variable presentations and involve only soft tissues and in combination with fractures. This soft tissue dissecting hematoma is often underestimated and may be an undiagnosed cause of a persistent state of shock in the critically injured patient in the initial approach.[1,2] The kinematics of trauma described correspond mainly to motor vehicle collisions; the most common anatomical location is the greater trochanter and hip, followed by the thigh, lumbosacral region, and abdominal wall. This injury

How to cite: Robledo-Madrid P, Espinosa-Queb NN, Salazar-Trujillo BA, Márquez-Gutiérrez EA, Vélez-Palafox M. Morel-Lavallée lesion in burned patients. Cir Gen. 2023; 45 (2): 93-98. https://dx.doi.org/10.35366/111510

usually results from high-energy trauma, also reported in contact sports, and postoperative complications.

The most common sites of clinical presentation of the lesion reported, are the greater trochanter or hip 30.4%; thigh 20.1%; pelvis 18.6%; knee 15.7%; buttock 6.4%; lumbosacral 3.4%; abdominal wall 1.5%; and lower leg 1.5%. Other authors suggest a higher prevalence of MLL in obese patients with body mass index (BMI) over 30.[3,4] Regarding the burn patient, there are few publications on the subject, limiting the information available for decision-making by a surgical team when this pathology occurs in the burn patient. The present research is focused on reviewing valuable data for the burns surgeon and commenting on clinical examples of patients in whom this lesion was documented in our burns center.[2]

Pathophysiology: MLL falls within the group of traumatic injuries, whose external forces during an impact cause separation between skin, subcutaneous fat, and underlying fascia creating a physical space between skin and fascia that can collect blood and inflammatory fluid with the possible risk of becoming infected or forming complex collections.[4,5] At the same time, the interruption of the blood vessels and lymphatic vessels in the subcutaneous space overlying the muscle fascia will promote this fluid accumulation leading to the separation of the soft tissue from the deep fascia, alteration of the vascular supply, lymphatic drainage, and perforating vessel connections between the tissue layers.[1,3,4] Special consideration should be given to interrupting the circulation of perforating vessels along the fascial planes as an essential source of continuous fluid accumulation, given the excellent capacity for fluid accumulation in the thigh, pelvis, and abdomen. These should be considered high-risk regions, especially in obese patients.[5,6] Burn injuries are underestimated in primary screening; patients with high energy mechanisms may mask more severe injuries. They involve both physical abrasion of the skin and thermal injury, so the precise extent can only be established once Jackson areas are delineated.

Clinical picture: we identified the most recent publications that describe and treat this lesion through bibliographic research in PubMed. MLL in the burn patient often goes unnoticed in the initial evaluation. In addition to the fact that these patients require resuscitation with higher volumes of crystalloids and blood products in the initial phase, they present a significant capillary leak that can condition fluid collection in anatomically at-risk areas such as the extremities and abdomen *(Figure 1)*. Although MLL is a closed lesion, possible complications include soft tissue or bone infection, wound dehiscence, and skin necrosis.[1] MLL evolves from a few hours to days after injury. Physical examination is based on several factors, including skin mobility, subcutaneous fluctuation, decreased skin sensation, generalized edema, and friction burns *(Figure 2)*. In the clinical evaluation, local pain is documented, and it is common to refer to hypoesthesia in the affected region due to damage to cutaneous nerve branches.[7]

Diagnosis: timely diagnosis will allow establishing an adequate surgical treatment, but should be mainly considered in patients with traumatic injuries associated with high energy mechanisms since these can present in combination with fat necrosis, lymphatic leakage, and hematomas with the possibility of evolving to infection, even presenting late *(Figure 3)*.[7,8] The separation of the vascular supply due to the shear mechanism can cause skin necrosis, also contributing to the mass effect caused by the accumulation of fluid, which further compresses the vascular plexus supply, increasing the pressure-related ischemia of a specific anatomical area.[8] Timely diagnosis and treatment are essential, as late diagnosis can lead to infection, formation of complex collections, and can even be misinterpreted later as a soft tissue neoplasm.[9]

Diagnostic imaging: they are usually classified into three different subtypes based on imaging: seroma, subacute hematoma, and chronic hematoma. The latter, chronic fluid accumulation, may become infected and eventually develop into an acute abscess or be encapsulated by a fibrous capsule if the collection remains sterile.[8,9] Several

Figure 1: *Initial assessment of a 69-year-old female patient with fire burn secondary to an explosion at home, presenting high-energy trauma kinematics that caused burns and contusion in the lumbar region, with clinical data of the Morel-Lavallée lesion. The total burned surface area was estimated at 15% (13% of the entire thickness of the third degree and 2% of the partial thickness of the second degree).*

imaging modalities can help diagnose an MLL, including ultrasound, CT, and MRI. Ultrasound is an effective tool for diagnosis and follow-up. However, due to the stages of evolution of the lesion: seroma, subacute hematoma, and chronic organized hematoma, its presentation can vary over time, and these lesions can be challenging to visualize. There are also published reports of MLL in the clinical context of high-energy trauma in combination with a collection of fluid in the subcutaneous tissues overlying the deep fascia with skin preservation.[9,10] In the acute setting, computed tomography may demonstrate a small, superficial hematoma; it allows the characterization of hematomas with the limitation that only one-third of lesions show active contrast or extravasation at the initial scan.[9] MRI is the gold standard in imaging diagnosis of MLL in its different stages. Hemoglobin appears hyperintense in T2 images; in a later stage, hemoglobin causes greater intensity in T1 images, with the limitation of being unable to be performed in critical patients or with hemodynamic instability.[9]

Treatment: surgical debridement is the treatment of an MLL; currently, less invasive methods have been proposed for better aesthetic and functional results, including non-surgical treatment or minimally invasive drainage. Scolaro et al. believe treatment can be based on lesion size, severity, and proximity to a planned surgical incision for coexisting lesions.[7,8] Smaller lesions may be amenable to non-surgical treatment or minimally invasive drainage. Larger lesions should be approached with debridement and bleeding control, especially when proximal to planned surgery, to avoid complications such as necrotizing fasciitis of surgical or traumatic wounds.[1,11] Burn patients present compromised epidermal circulation and subcutaneous tissue in the injured segment and the periphery of the lesion, making it difficult

Figure 2: *Shock cubicle assessment of a 45-year-old male patient with fire burns secondary to an explosion in his work area, accompanied by high-energy trauma to the arms, thorax, abdomen, and lumbar region with clinical data of Morel-Lavallée lesion in the lumbar region. The total burned surface area was estimated at 30% (25% third-degree total thickness, 5% second-degree partial thickness).*

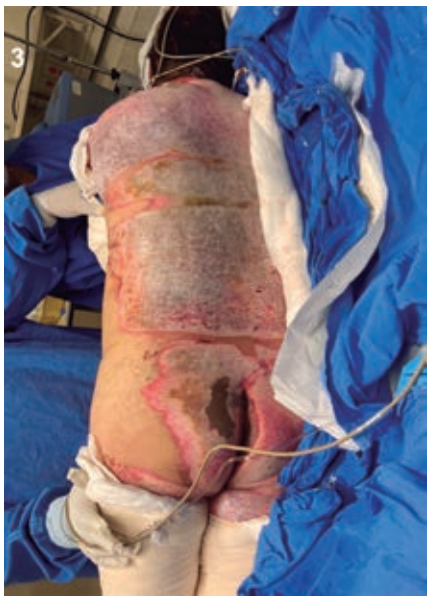

Figure 3: *56-year-old female patient with fire burn secondary to an explosion in an enclosed space, accompanied by high-energy trauma to the posterior thoracic and lumbar region, presenting Morel-Lavallée lesion in the left thoracolumbar region. The total burned surface area was estimated at 40% (30% third-degree total thickness, 10% second-degree partial thickness).*

to determine the long-term viability of the overlying tissue. The Mayo Clinic presented its experience with 87 patients with MLL from trauma caused mainly by motor vehicle collisions.[7,12] The investigators compared surgical debridement, minimally invasive drainage, and nonoperative management. They concluded that surgical debridement was less likely to have a recurrence than nonoperative management and minimally invasive drainage (15, 19, and 56%, respectively). They reported 50 ml of aspirated fluid more likely to recur (83% vs 33%, $p = 0.02$), suggesting considering this cutoff as a starting point for large lesions.[7,12] Negative pressure therapy following surgical debridement aids resolution and prevention of fluid accumulation, application of autograft to replace the skin defect offers the most predictable results. Another strength of our study is the ability to document the microorganisms present in a secondary infection and accompanying clinical data, such as fever, leukocytosis, cellulitis, pain, and morbid obesity.[13,14]

The treatment algorithm for MLL most useful in the burn patient requires evaluation between acute or chronic injuries with or without infection data and with associated fractures; it establishes three types of damage and their treatment:

1. Acute injuries can be treated with compression and surveillance.
2. Injuries with infection or fracture can be treated with surgical debridement and wound closure with negative pressure therapy.
3. Chronic lesions can be treated initially with percutaneous drainage, and if they do not improve, surgical debridement with negative pressure therapy and secondary closure is recommended.

Recommendations

When it is in the lumbar region and shows hemodynamic stability, hematoma delimitation with marking and compression of the patient's body weight can be a valuable initial resource. It can be complemented with a CT scan.

DISCUSSION

MLL occurs in patients with traumatic injuries associated with high-energy mechanisms, whose large tangential forces displace subcutaneous adipose tissue and superficial fascia from the underlying deep fascia. This mechanism damages perforating arteries, veins, and lymphatic vessels, accumulating fluid in the inter-fascial plane.[3] The damage often goes unnoticed in initial care because of the larger, more visible lesions; the lumbar region and trochanter are the most common sites because of their prominence, large surface area, skin mobility, and rich capillary network in the soft tissue.[4] A detailed interrogation diagnoses the trauma film, a detailed physical examination, a clinical evaluation, and with the support of some imaging methods. Ultrasound can be used in the acute phase, where CT and MRI are unavailable. Fluid collections with

heterogeneous echogenicity are seen in the acute phase; the lesion is usually compressible and without flow on Doppler imaging. Chronic lesions tend to be more homogeneous with capsule formation. MRI is the gold standard for imaging diagnosis of MLL.[3,6,7] In burn patients with extensive surface areas and associated high-energy trauma, MLL can easily be missed due to deepening burns, high crystalloid volumes, blood products required in the initial resuscitation phase, and capillary leakage into the extracellular space. In the burn patient, it is essential to consider this type of injury during serial reviews to identify burned areas that occur in combination with this injury.[14]

Controversy exists regarding the timing and type of subsequent treatment in extensive lesions involving the different layers of the skin in patients with aggregate complications and data of hemodynamic instability, such as the large burn, so more research is needed to provide standardized, evidence-based methods.[15]

CONCLUSIONS

It is an infrequent lesion for randomized controlled trials; publications are institutional case reports, surgical group experience, and retrospective treatment analyses. MLL can be easily missed in burn patients with extensive surface and traumatic injuries associated with high-energy mechanisms. In the approach to these patients, detailed investigation of trauma kinematics, structured and systematized evaluation according to the initial management protocol of the Advanced Trauma Life Support (ATLS) course or any burn patient approach course. Maintaining a high index of suspicion of associated traumatic injuries together and performing serial revisions by the same team are the safest and most efficient strategies.

ACKNOWLEDGMENTS

Thanks to Brigadier General Medical Surgeon Héctor Faustino Noyola Villalobos and Colonel Medical Surgeon Luis Manuel García Núñez, who, during the training as a general surgeon, instilled an interest in the care of trauma patients and, during an academic visit the ones who explained what this injury initially consisted of.

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Ethical considerations and responsibility: the privacy of the data used was handled according to the protocols established in our work center.

It is stated that the protocols on patient data privacy have been followed and their anonymity preserved.

Funding: no financial support was received for the preparation of this work.

Disclosure: none of the authors have a conflict of interest in the conduct of this study.

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CLINICAL CASE
doi: 10.35366/111511

Cirujano General
April-June 2023
Vol. 45, no. 2 / p. 99-105

Upper intestinal occlusion due to gallstone ileus in a young adult

Oclusión intestinal alta secundaria a íleo biliar en un adulto joven

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Keywords:
intestinal occlusion, biliary ileus, longitudinal enterolithotomy, pneumobilia, cholecystoenteric fistula.

Palabras clave:
oclusión intestinal, íleo biliar, enterolitotomía longitudinal, neumobilia, fístula colecistoentérica.

ABSTRACT

Introduction: biliary ileus is a mechanical intestinal occlusion due to obstruction of the intestinal lumen by a gallstone. A rare complication of cholelithiasis occurs in 1 to 4% of all mechanical obstructions. **Clinical case:** this is a 36-year-old male with a clinical picture of abdominal pain in the epigastrium that later generalized; he also had emesis of gastro alimentary and biliary contents, no gas channeling, and absence of bowel movements. He denies surgical interventions and refers vesicular lithiasis diagnosed one year before. At the physical examination, he had a distended abdomen, absence of peristalsis, generalized metallic noises, muscular resistance, positive rebound, and tympanic abdominal sounds. Laboratory tests: Na 122 mmol/l, K 4.1, white blood cells 14,100/mm^3, PT 13.4, PTT 29, albumin 4.5, TB 1.5, DB 0.5, OB 1.0. Simple and contrasted computed tomography (CT) was performed, which reported an ectopic gallstone, pneumobilia, and bowel loop distension. It was decided to perform exploratory laparotomy with longitudinal enterolithotomy. **Conclusions:** for diagnosing biliary ileus, simple and contrasted abdominal CT should be used, and the most advantageous and safest surgical option should be chosen.

RESUMEN

Introducción: *el íleo biliar es una oclusión intestinal de tipo mecánico debida a la obstrucción de la luz intestinal por un cálculo biliar. Es una complicación rara de la colelitiasis que ocurre en 1 a 4% de todas las obstrucciones de tipo mecánico.* ***Caso clínico:*** *masculino de 36 años con cuadro clínico de dolor abdominal en epigastrio, posteriormente generalizado, emesis de contenido gastroalimentario y gastrobiliar, no canaliza gases y presenta ausencia de evacuaciones. Niega intervenciones quirúrgicas, refiere litiasis vesicular de un año de evolución. Durante la exploración física tenía abdomen distendido, ausencia de peristalsis, ruidos metálicos generalizados, resistencia muscular y rebote positivo, además de timpanismo. Pruebas de laboratorio: Na 122 mmol/l, k 4.1, leucocitos 14.1, TP 13.4, TPT 29, albúmina 4.5, BT 1.5, BD 0.5, NI 1.0. Se realizó tomografía computarizada (TC) simple y contrastada que reportó cálculo biliar ectópico, neumobilia y distensión de asas intestinales. Se decidió laparotomía exploratoria realizando enterolitotomía longitudinal.* ***Conclusiones:*** *para el diagnóstico de íleo biliar deberá usarse TC de abdomen simple y contrastada, además se debe escoger la opción quirúrgica más ventajosa y segura.*

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Received: 05/16/2022
Accepted: 05/02/2023

INTRODUCTION

Biliary ileus is a mechanical type of intestinal occlusion due to obstruction of the intestinal lumen by a gallstone.[1] It is the cause of 1 to 4% of all obstructions of mechanical type and up to 25% of the causes of intestinal obstruction after 65 years of age; the average age of presentation is 74 years.[2] Generally, it is a gallstone whose size is greater or equal to 2.5 cm; this means that it is complicated for gallstones with smaller sizes than those mentioned to cause an obstructive condition.[3,4]

The passage of the litho into the digestive tract occurs through a fistula between the gallbladder and the digestive tract, so a cholecystoduodenal fistula is the most common in 85% of cases; the other 15% are hepatoduodenal, choledochoduodenal, cholecystogastric, cholecystojejunal, and cholecystocolonic fistulas; these appear when there are recurrent episodes of acute

How to cite: Novelo-Vallado ER, Pech-Sosa EB. Upper intestinal occlusion due to gallstone ileus in a young adult. Cir Gen. 2023; 45 (2): 99-105. https://dx.doi.org/10.35366/111511

cholecystitis with severe inflammation and adhesions to the digestive tract.[4] Other mechanisms are migration through the ampulla of Vater, followed by their growth *in situ* or manipulation during cholecystectomy.[4]

The clinical presentation can be acute with abdominal distension, vomiting, and constipation; subacute with no bowel movements but gas channeling (low-grade intestinal obstruction); chronic or Karewsky's syndrome consisting with recurrent episodes of abdominal pain caused by the passage of gallstones through the intestine, alternating with an asymptomatic period until the complete obstruction is reached. Other symptoms are the absence of peristalsis, hydro electrolyte imbalance, jaundice, and the so-called Mordor triad (history of cholelithiasis, acute cholecystitis, and sudden onset of intestinal occlusion).[4]

Within the diagnostic approach, imaging studies such as standing and decubitus simple abdominal radiographs are used with a sensitivity between 40 and 70%.[4] The gold standard for diagnosis is an abdominal CT scan, simple and contrasted, with the following diagnostic criteria: signs of small bowel obstruction, ectopic gallstone, abnormal gallbladder, presence of hydro-aerial levels, or the presence of edema and irregular gallbladder wall.[4] Although MRI can visualize in almost 100% of cases the signs of Rigel's triad, which will be discussed later, this study does not play an essential role in the diagnosis of this pathology; as well as abdominal ultrasound which, although it is the method of choice in the detection of gallbladder lithiasis, it is rarely used for diagnostic purposes in unstable patients with acute abdomen.[4]

Regarding treatment, two options have often been the subject of debate: on the one hand, enterolithotomy and delayed cholecystectomy, and on the other hand, enterolithotomy, delayed cholecystectomy, and fistula closure in a single operation.[3]

PRESENTATION OF THE CASE

We present the case of a 36-year-old male with the following important history.

Personal pathological history: he had a known diagnosis of gallbladder lithiasis one year before.

Current condition: he started with burning epigastric abdominal pain of intensity 8/10 on the visual analog pain scale, as well as dyspepsia and early satiety sensation within 30 days of evolution. This symptomatology intensified seven days prior to his hospital admission with aggravation of epigastric pain that later became generalized in the four quadrants of the abdomen, with an intensity 9/10 on the visual analog pain scale, accompanied by emesis of gastro alimentary and gastro biliary contents, as well as the absence of gas channeling, bowel movements and increase in abdominal perimeter; probably related to the previous intake of cholecystokinetic foods. The patient denied fever, choluria, acholia, transfictive abdominal pain in the right hypochondrium, and hyporexia; at the time of hospital admission, he also reported having been medicated for 72 hours with antibiotics, antiemetics, and unspecified analgesics without any improvement, which is why he came to the emergency department of our hospital.

Physical examination: he was conscious and oriented, with pallor of the integuments and inadequate hydration. He had a heart rate of 128 beats per minute, respiratory rate of 24 breaths per minute, temperature of 36.5 ºC, oxygen saturation of 98% without supplemental oxygen, and blood pressure of 100/60 mmHg. Cardiac and respiratory examination showed no apparent alterations. A nasogastric tube was inserted and drained 400 ml of a liquid of fecaloid characteristics. His abdomen was distended. He had no scars and was painful to palpation with voluntary muscle resistance, and a positive rebound sign. Peristaltic movements were auscultated, and some generalized metallic noises were heard, with generalized tympanic sounds to percussion. Rectal examination showed an empty rectal ampulla.

Labs on May 29, 2020 reported white blood cells of 14,100/mm^3 (67% neutrophilia), hemoglobin (Hb) of 18.2 g/dl, platelets of 341,000/mm^3, prothrombin time (PT) 13.4, thromboplastin time (TT) 29.0, INR 1.11, alkaline phosphatase 113 mg/dl, total bilirubin 1.5 mg/dl, direct bilirubin 0.5 mg/dl, indirect bilirubin 1.0 mg/dl, albumin 4.5 g/l, creatinine 2.1 mg/l, glucose 186 mg/dl, amylase 121.1

Figure 1: *Simple abdominal X-ray. Hydro-aerial levels and absence of distal gas are seen.*

mg/dl, lipase 225 mg/dl, sodium 126 mmol/l, chloride 71.4 mmol/l, potassium 4.1 mmol/l.

On standing and decubitus abdominal simple radiographs *(Figure 1)* a coin stack image was evidenced, as well as distension of the small bowel loops, with the absence of gas in the distal intestine.

An abdominal ultrasound showed normal intrahepatic biliary tract, a 6 × 3 cm gallbladder with 5 mm wall, and several dense lithos of 9 to 10 mm in its interior with posterior acoustic shadow. The common bile duct measured 4 mm and portal vein 8 mm, and the pancreas was seen with a heterogeneous surface on the ultrasound scan. The whole abdomen shoed images of a nonspecific ileus; therefore, it was concluded with the ultrasound data that the patient had a chronic calculous cholecystitis, ruling out pancreatitis, a sub-occlusive ileus, and modified appendicitis was not ruled out.

Simple and contrasted tomography of the abdomen *(Figure 2)* showed a normal intrahepatic and extrahepatic biliary tract, non-visible gallbladder, common bile duct, and portal duct of normal caliber, and pancreas and spleen with an average density, morphology, and size. Distension of jejunal loops were seen with retention of liquid content and minimal air bubbles scattered through its wall, apparently secondary to a round, thick-walled image, and with liquid content of 31 mm in diameter in the proximal ileum. A cecal appendix medial to the cecum was seen without inflammatory changes measuring 44 mm long and 6 mm thick.

Based on the above, an analysis of the interrogation and clinical picture was performed, the conclusion of which was that it was a case of high intestinal occlusion of etiology to be determined since the patient had no surgical history to consider postoperative adhesions, which are the primary etiology in these cases, therefore, taking into account the patient's history of vesicular lithiasis, the patient was intentionally reinterrogated until an apparent relationship was found with the intake of cholecystokinetic foods a week prior to the intensification of symptoms, at the same time that medical treatment was started for intestinal occlusion with analgesia, hydro electrolyte replacement, and the placement

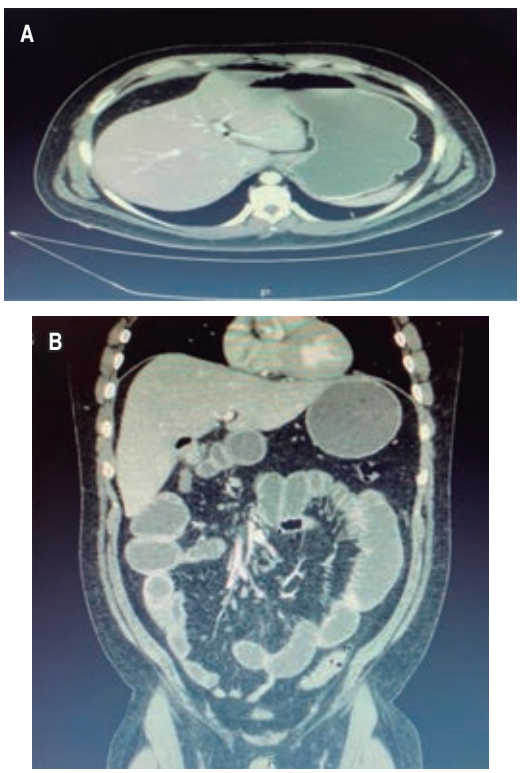

Figure 2: *Simple and contrasted computed tomography scan of the abdomen. Coronal section **(A)** and axial section **(B)**. Distension of jejunal loops with retention of liquid content secondary to a foreign body of 31 mm in diameter in the proximal ileum is seen.*

of a nasogastric tube, with which 400 ml of a fecaloid liquid were obtained. Due to the lack of improvement with these measures, as well as clinical and paraclinical data of systemic inflammatory response and tomographic findings, absence of gallbladder visualization, the air in gallbladder fossa, presence of pneumobilia (not reported), distension of small bowel loops, probable ectopic gallstone proximal to the ileocecal valve and scarce intra-abdominal free fluid, it was decided to undergo an exploratory laparotomy with the following pre-surgical diagnoses: intestinal occlusion, biliary ileus vs. intestinal perforation.

The transoperative findings were generalized distension of ileum and jejunum loops, and a 3 cm gallbladder litho impacted 90 cm from the ileocecal valve, which caused high intestinal occlusion. A healthy cecal appendix, a non-palpable gallbladder, and a scarce reaction fluid was found.

It was decided to perform enterolithotomy with the extraction of the litho and primary closure in two planes with the Connell-Mayo technique with polyglactin 910 3-0 atraumatic needle and an interrupted Lembert suture with silk and 3-0 atraumatic needle. The cholecystectomy as deferred *(Figure 3)*. A half-inch Penrose-type drain was placed into the pelvic recess and closed in planes with a 0 polyglactin 910 sutures for the wall and skin closure by simple stitches with Nylon Preto 3-0 monofilament.

Then he was admitted to postoperative care, where he presented gas channeling 12 hours after the procedure and started liquid diet 48 hours after the surgical event with progression of the same due to adequate tolerance, with absence of fever; because of this, analgesia was left with paracetamol, one gram intravenous every eight hours for five days, ketorolac 30 mg intravenous for three days, antibiotic ceftriaxone one gram every 12 hours for five days, and metronidazole 500 mg every eight hours for five days. There were regular bowel movements, and laboratory tests reported white blood cells 10,200/mm^3, platelets 340,000, Hb 12.5 g/dl, and serum creatinine 0.7 mg/dl; so it was decided to discharge the patient from the service due to improvement, with a follow-up appointment for removal of stitches ten days after the surgical event.

DISCUSSION

Biliary ileus is currently considered a rare entity, causing 1-4% of cases of mechanical intestinal obstruction, which increases up to 25% in patients over 65 years of age, represents 0.3 to 0.5% of the complications of biliary disease, and is more prevalent in women with a female to male ratio of 3.5-3.6:1[1,4-6] which contrasts with our patient who was male, in an age range outside those mentioned and without risk factors for biliary pathology; therefore we

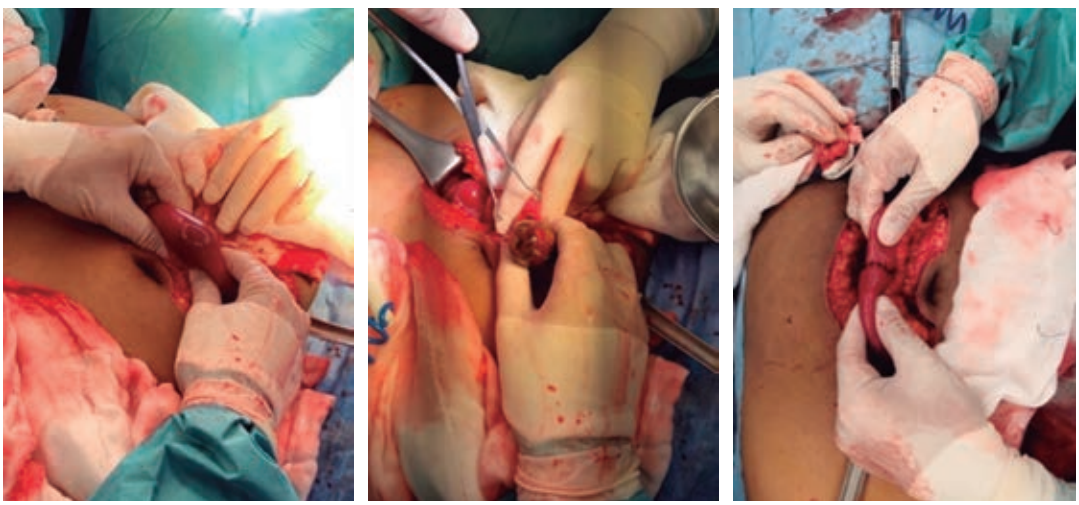

Figure 3: *Exploratory laparotomy through a longitudinal enterolithotomy.*

consider it essential to make this case report, as well as a review of the therapeutic options that have been the subject of current debate.

It corresponds to a complication of vesicular lithiasis, in which repeated episodes of acute cholecystitis originating a bilio-enteric fistula, favoring the passage of the litho towards the intestinal lumen. The cholecystoduodenal fistula is the most frequent with a frequency of 85%. Others fistulas involve the stomach and the colon ant they are only diagnosed preoperatively in 10% of the cases so it is the less frequent variant; the size of the litho is relevant, since from 2 to 2.5 cm it is capable of producing obstruction that most of the times have its impaction in the distal ileum 5 cm is capable of producing obstruction that most of the times impacts in the distal ileum.[1-6] In our case report we found a 3.0 cm litho impacted 90 cm from the ileocecal valve in the terminal ileum, according to reported in the literature.

This is known as Barnard's syndrome, the most frequent type of biliary ileus, where the reported symptomatology is diffuse colicky abdominal pain, which is then located in the right iliac fossa, associated with nausea and vomiting of gastro biliary content, abdominal distension, absence of peristalsis, constipation, fluid imbalance, and signs of peritoneal irritation;[1-5,7] with this clinical picture we evidenced that our patient presented this symptomatology for approximately 30 days.

The physical examination is nonspecific, so biliary ileus is suspected in an elderly patient with Mordor's triad (history of gallstone, signs of acute cholecystitis, and sudden onset of intestinal obstruction),[1] however, in our patient, there were no signs of acute cholecystitis at the time of the initial examination; it is essential to note that he arrived within seven days of evolution and with clear signs of intestinal occlusion and even risk of perforation; the same symptomatology originated after the ingestion of cholecystokinetic food which, together with the history of vesicular lithiasis, made us consider the diagnosis of biliary ileus despite the absence of pain in the right hypochondrium, for which simple and contrasted abdominal tomography was requested. It is also worth mentioning that during those seven days, he was under antibiotics, analgesic drugs, and antiemetic medication, which could have masked the signs of acute cholecystitis.

Sanchez-Perez et al. reported in 2016 that the most frequent biochemical alterations are hypokalemia (60%), hyponatremia (40), and metabolic alkalosis;[6] other abnormalities are leukocytosis and altered liver functional tests.[1] This is according with what was reported in our case regarding hyponatremia, leukocytosis, alterations in liver functional tests, and alkalosis, so part of the initial treatment is hydro electrolyte and acid-base replacement.

The imaging studies began with abdominal radiographs in which Rigler's triad was expected to be evidenced: ectopic gallstone, pneumobilia, and distension of intestinal loops; the diagnosis is considered when two of these are present, and we speak of Rigler's tetrad when the change of position of the stone concerning the previous radiograph is documented.[1,2] In our patient, it was impossible to find these findings since the simple abdominal X-rays only showed a hydro-aerial level in the right hemiabdomen, distension of intestinal loops, and absence of air in the distal intestine.

Chang and colleagues, in 2018, reported that Rigler's triad on radiographs is present in 14 to 53% of cases, whose sensitivity is 40 to 70%, as well as the visualization of gallstones in 10 to 20% of cases in those containing calcium to be radio opaque.[2,6] This was also according to what was found in our patient. For that reason, a cholesterol stone was thought to be present, and since there was no apparent cause of the obstruction, a contrasted abdominal tomography scan was requested, which is currently considered the study of choice for diagnosis since it is possible to visualize Rigler's triad in up to 80% of cases with an approximately 90% sensitivity.[1,6]

The diagnostic criteria for biliary ileus by tomography are signs of small bowel obstruction, ectopic calculus, abnormal gallbladder, air collection, hydro-aerial levels, or peri vesicular edema with an irregular wall.[2] In our case, Rigler's triad was present when performing the CT scan in a manner that coincided with that reported in the literature.[2] Ultrasound can demonstrate the Rigler's triad in some series;[6] however, in our case, it reported

a possible complicated acute appendicitis and was able to determine acute cholecystitis.

The treatment of this pathology is surgical; however, it starts with rehydration measures and correction of acid-base and electrolyte imbalances. There are two therapeutic options: on the one hand, enterolithotomy with stone extraction and deferred cholecystectomy, and on the other hand, enterolithotomy with cholecystectomy and fistula closure in a single surgical procedure.[2,3,8] The first option represents less surgical risk and is often preferred since they are elderly patients with multiple comorbidities, and it is performed more frequently.[1,3] Despite not being a patient with comorbidities and being stable at the time of the surgical event, we decided to perform a longitudinal enterolithotomy in the antimesenteric border of the ileum with transverse enterorrhaphy in two planes and cholecystectomy in a second surgical time, since we consider that this one has better results based on what has been reported in the literature.

In 2019, Hurtado and his team reported the case of a male patient outside the typical age range for presenting the picture and in whom they opted for enterolithotomy, cholecystectomy, and fistula closure, who underwent exploratory laparotomy on four occasions. This approach resulted in a total in-hospital stay of 31 days, including admission to the intensive care unit and discharge with an abdominal wall defect (post-incisional hernia).[1]

Soliva D and colleagues, in 2018, opted to perform enterolithotomy and deferred cholecystectomy, the result of which was an adequate postoperative evolution;[3] which contrasts with our patient since no postoperative complications were reported, nor another surgical event and he was discharged six days later without the need for intensive care stay.

Sanchez-Perez et.al.,[6] in 2016, reported that one-stage surgery is possible when cholecystectomy is evaluated and defined as technically simple and always using transoperative cholangiography, as well as when performing intestinal closure in two planes. In 50% of the cases, the fistula closes spontaneously.[7] This was another reason we preferred to perform enterolithotomy and deferred cholecystectomy due to the lack of transoperative cholangiography during the night shift in our center.

In 2018, Mirza M and his team reported that laparoscopic enterolithotomy is preferable if performed by an expert surgeon in an adequately equipped center.[9]

Other alternative therapeutic methods include colonic laser lithotripsy, extracorporeal shock wave, argon lithotripsy, and endoscopic hydroelectric laser lithotripsy.[6]

CONCLUSIONS

For the diagnosis of biliary ileus, it is essential to have a high diagnostic suspicion in the clinical context of a patient like the one presented in this case; however, there are reported cases of patients outside the typical age range which represent a diagnostic challenge that requires to rely on simple and contrasted abdominal tomography scan as the imaging method of choice to avoid delaying the diagnosis and treatment, taking into account that surgery in a single time represents more significant morbidity and mortality for the patient;[10] because of this we concluded that the best option for our patient was to perform the treatment in two surgical times: the first to resolve the urgency (intestinal occlusion) and the second time to plan an elective cholecystectomy with previous documentation of the fistula in order to achieve adequate planning of its correction.

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Ethical considerations and responsibility: data privacy. According to the protocols established in our work center, we declare that we have followed the protocols on patient data privacy and preserved their anonymity.

Funding: no financial support was received for the preparation of this work.

Disclosure: none of the authors have a conflict of interest in the conduct of this study.

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CLINICAL CASE
doi: 10.35366/111512

Cirujano General
April-June 2023
Vol. 45, no. 2 / p. 106-110

Renal abscess with fistula to the spleen

Absceso renal con fístula a bazo

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Keywords:
renal abscess, fistula, pyelonephritis, spleen.

Palabras clave:
absceso renal, fístula, pielonefritis, bazo.

ABSTRACT

Renal abscesses are an accumulation of pus in the renal parenchyma. They are rare and potentially fatal, related to risk factors and comorbidities mainly to renal lithiasis, diabetes mellitus, urinary anatomical alterations, and complicated pyelonephritis, among other factors, with bacteriological isolation mainly of *Escherichia coli*, in addition to other bacteria such as *Staphylococcus aureus* and *Klebsiella pneumoniae*. They represent 0.2% of all intra-abdominal abscesses, and 10% of renal abscesses are complicated with spontaneous rupture, sepsis, and shock as the most severe consequences; they have an incidence of two to four cases per 10,000 people per year. They have a very vague clinical presentation, and the diagnostic suspicion is generally delayed, so it is common to be discovered when they present significant progress in their pathogenesis, requiring more intensive management. We present the case of a young, healthy patient with no other risk factors, such as malformations or comorbidities, who developed a renal abscess secondary to pyelonephritis, unusually complicated with fistulation to the spleen.

RESUMEN

Los abscesos renales son una acumulación de pus en el parénquima renal, son raros y potencialmente mortales, relacionados a factores de riesgo y comorbilidades principalmente a litiasis renal, diabetes mellitus, alteraciones anatómicas urinarias, pielonefritis complicadas, entre otros factores; con aislamiento bacteriológico principalmente de Escherichia coli, *además de otras bacterias como* Staphylococcus aureus *y* Klebsiella pneumoniae. *Representan 0.2% de todos los abscesos intraabdominales y 10% de los abscesos renales se complican con ruptura espontánea, sepsis y choque como consecuencias más graves, tienen una incidencia de dos a cuatro casos por cada 10,000 personas al año. Tienen una presentación clínica muy vaga y generalmente la sospecha diagnóstica se retrasa, por lo que es común sean descubiertos cuando ya presentan un avance significativo de su patogenia, siendo necesario manejo más intensivo. Se presenta el caso de una paciente joven, sana y sin otros factores de riesgo como malformaciones o comorbilidades, que presentó un absceso renal secundario a pielonefritis complicándose inusualmente con fistulización hacia bazo.*

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Received: 07/30/2022
Accepted: 06/08/2023

INTRODUCTION

Renal abscesses are an infectious pathology defined as an accumulation of pus encapsulated and confined in the renal parenchyma. They are rare entities because not all cases are reported, and the need for complementary examinations for their identification is not available in all centers; they are potentially mortal due to their anatomical location, delay in diagnosis, late establishment of treatment, and affection of renal function (1-14%)[1,2] which are commonly related to renal lithiasis (48%),[1] diabetes (38%),[1,2] anatomical alterations of the urinary tract (13.3%),[1] and secondary to complicated pyelonephritis (14.3%),[1] among other causes, with bacterial isolation as the primary causal agent, mainly *E. coli* (54%), *S. aureus* and *K. pneumoniae*.[1,3] They have a low incidence due to those factors mentioned above, which rarely occur without risk factors and other pathologies (1.1 cases per 10,000 people without risk factors and 4.6 per 10,000 people with diabetes).[4-6] Their prevalence is higher in Asian populations, although the pathology has not been studied or reported in the rest of the world. It has

How to cite: Meza-Jasso MA, Serrano-Collazos S, Reyes-Aranda A. Renal abscess with fistula to the spleen. Cir Gen. 2023; 45 (2): 106-110. https://dx.doi.org/10.35366/111512

also been related to dietary habits, although an established relationship has yet to be demonstrated.[1] A clinical case of clinical progression and a review of the published literature regarding renal abscesses and their complications are presented.

PRESENTATION OF THE CASE

We present the case of a 40-year-old previously healthy woman with a history of two previous cesarean sections in 2004 and 2007, denying other history and morbidities; one month before her hospitalization, she was transfused for anemia. The details, diagnosis, or medical studies performed are unknown. She also had a weight loss of 8 kg, pain in the left hypochondrium with irradiation to the back, colicky pain that worsened on the inspiration during three months of evolution, with a presentation that fluctuated over time with greater intensity and that subsided spontaneously or with self-medicated analgesics such as paracetamol and ibuprofen. Shortly before her medical evaluation, she reported that dyspnea of medium efforts was added. She went to a private clinic when she presented an aggravation of the symptoms with the presence of pain, but with greater intensity than usual, nausea without vomiting, anorexia, adynamic, and sensation of thermal rise without acute measurement; during her medical evaluation, a simple tomography of the thorax and abdomen was performed where a left pleural effusion of 20% and a probable left renal abscess with extension to the spleen were found without further medical data specified by the patient; there is no medical summary of this event.

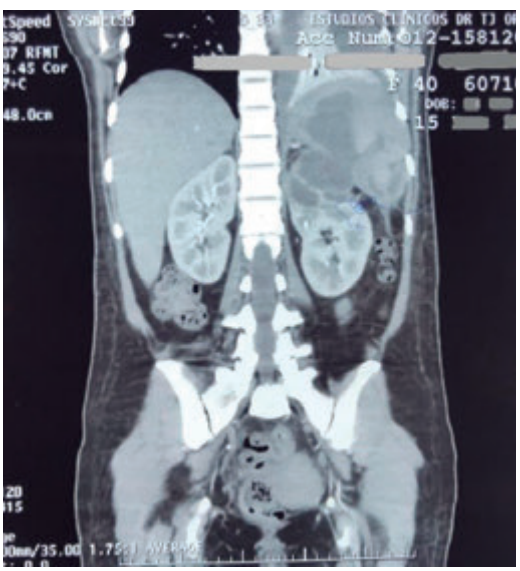

Figure 1: *Coronal section of a simple abdominal CT scan coronal section: the left kidney with a lesion in the upper pole communicating to the spleen with fluid inside is seen.*

On admission to our hospital, she was conscious; her vital signs showed a blood pressure of 90/60 mmHg, heart rate of 92 beats per minute, respiratory rate of 18 breaths per minute, peripheral oximetry with ambient air saturation of 90%, temperature on admission of 37.6 ºC, which during his management in the emergency room averaged 38 ºC. The physical examination showed basal hypoventilation of the left lung and pain in the left hypochondrium and epigastrium without peritoneal irritation or muscle resistance. The rest of the physical examination was without alterations or data relevant to the clinical picture. Laboratory tests showed hemoglobin 10.5 mg/dl, hematocrit 29.4%, white blood cells 8,800/µl, neutrophils 78%, lymphocytes 14.8%, fibrinogen 597 mg/dl, alkaline phosphatase 119 IU/l, lactate dehydrogenase 191 IU/L, lipase 117 U/l and C-reactive protein 37.5 mg/l, and creatinine 0.7 mg/dl. The urinalysis showed amber urine with pH 5, leukocyte esterase 500 cells/µl, protein 25 mg/dl, 10-15 erythrocytes per field, leukocytes 25-30/field, and abundant bacteria. A new contrasted abdominal tomography scan showed a 20% left pleural effusion, a kidney with cysts communicating with the spleen, and splenomegaly with abscesses inside *(Figure 1)*. She had clinical deterioration six hours after admission with decreased blood pressure, maintaining mean arterial pressures between 60-70 mmHg, tachycardia with 110 to 120 beats per minute within the average range, diaphoresis, persistent and increased abdominal pain, so it was decided to urgently admit the patient to the operating room to perform an exploratory laparotomy. The left retroperitoneal space was checked with the Cattell-Braasch maneuver, finding an intense perisplenic

Figure 2: *Anatomical pieces extracted during surgery. The left kidney is seen adhered to the spleen.*

inflammatory reaction and adhesions between the spleen and left diaphragm, liver, kidney, and retroperitoneal area; the left kidney had a loss of anatomy in the upper pole with abscessed cysts and communicated with the spleen with the presence of an abscess inside *(Figures 2 and 3)*. Splenectomy and *en bloc* nephrectomy were performed; pus was found inside both pieces and sent to pathology for study, and a Penrose-type drain was placed and directed to the surgical bed. In the histopathological examination, both organs were found adhered with irregular edges, abscessed areas, congestion, and fibrinopurulent material. In conclusion, a left kidney with abscessed acute pyogenic pyelonephritis (renal and splenic pyogenic abscesses) negative for malignancy was found.

The patient continued to evolve post-surgery for ten days in the hospital, in good general condition, with vital signs in adequate ranges, afebrile during his stay, treated with double analgesic drugs (paracetamol and tramadol), antibiotic therapy with imipenem during her stay, with Penrose drainage that was maintained with minimal serohematic output with a progressive decrease (from 80 ml the first day after surgery and 30 ml the last day) and was withdrawn on the sixth day of the operation. She presented adequate tolerance to the oral diet that evolved progressively, with creatinine and urea control in normal ranges (highest creatinine 1.6 mg/dl and highest urea 56 mg/dl) being evaluated by the nephrology service with subsequent referral to their ambulatory office without requiring management by nephrology at this time. The patient attended a follow-up appointment one month after discharge, reporting minimal pain in the wound and surgical region, with healed wounds and no signs of infection, with tolerance to regular oral diet, with standard and frequent bowel movements and urination, asymptomatic, presenting general control lab tests all in normal ranges (creatinine 1.1 mg/dl, urea 28 mg/dl). After this consultation, the patient did not attend again.

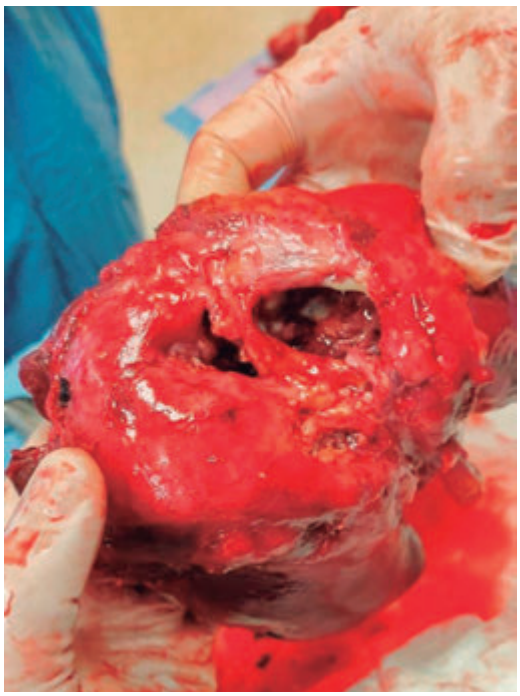

Figure 3: *Anatomical pieces extracted during surgery. Both organs are seen to be communicated by an abscess.*

DISCUSSION

Renal abscesses are an infrequent pathology,[1,2,7] because they are underreported due to their vague clinical presentation, low diagnostic suspicion, and the need for complementary tests for their identification. Its incidence varies between 2.24-4.6 cases per 10,000 people per year.[3,4] Abscess formation generally occurs in the context of pyelonephritis in the majority of cases; it usually occurs more frequently in patients who also present other risk factors such as vesicoureteral reflux or renal lithiasis,[5,6] in addition to accompanying pathologies and other conditions that contribute to its development as has already been mentioned, mainly with comorbidities such as diabetes and the sum of several of them.[7-9] It rarely presents without risk factors and anatomical abnormalities.[1,7,10] The diagnostic possibility should be considered in the presence of a patient with risk factors or urinary symptoms. Once the clinical suspicion is established, the diagnostic approach should be completed with contrasted tomography to evaluate the presence of the abscess characteristics and plan the drainage or surgical treatment. Treatment with antibiotic therapy should be started immediately since its progression represents a high risk of morbimortality, with an increased risk of infection progression with renal function impairment, the possibility of shock, and other complications.[1,4,5] This is an infrequent pathology, as has been previously mentioned. We present this case since we consider it of interest and relevance as a contribution to the medical literature and current epidemiology due to its peculiarity since the patient did not have risk factors to develop a renal abscess, much less complications given the particularity in which it progressed. There are few reports in the medical literature of cases that have been complicated in a particular way to other organs, such as the lung; however, no other reports of abscesses that have been complicated with fistulation to the spleen were found, so this is a peculiar case.

CONCLUSIONS

Renal abscesses represent an infectious pathology not very frequent, which is why they should be considered as a differential diagnosis in similar cases or the approach of a case with urinary tract infection of complex control, aggressive presentation, and delicate clinical condition, as well as to be referred promptly if necessary. They can present a high morbimortality rate when they appear and can be complicated with the involvement of other adjacent organs and systems, as described in the literature, deteriorating the quality of life of the affected person, or even causing death if not treated timely and effectively. It should be treated by a multidisciplinary team, usually requiring hospitalization and specialty assessment. We must also raise awareness about the rational use of bacterial resistance and the indiscriminate use of antibiotics since this may be a factor in the future presentation of more renal abscesses with greater severity, ineffective non-medical treatment, and aggressive clinical manifestations that may compromise a more significant number of cases. Whenever necessary, surgical treatment should not be delayed.

ACKNOWLEDGMENTS

We thank the Institute for the facilities provided for this work.

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Financing: all the resources used were lent by the institute (IMSS) for the patient's care; no other resources were used for its implementation.
Disclosure: all authors of this case report declare that we have no conflict of interest.
Informed consent: the patient's authorization to present the case was obtained.

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CLINICAL CASE
doi: 10.35366/111513

Cirujano General
April-June 2023
Vol. 45, no. 2 / p. 111-115

Perforated esophageal leiomyoma. Management in a third level hospital

Leiomioma esofágico perforado. Manejo en un hospital de tercer nivel

Juan Manuel Reyes-Morales,* Karina Sánchez-Reyes*

Keywords:
leiomyoma,
mediastinitis,
esophagus, surgery.

Palabras clave:
leiomioma,
mediastinitis, esófago,
cirugía.

ABSTRACT

Introduction: leiomyomas are the most frequent benign tumors of the esophagus. They are frequently found in the lower and middle third of the esophagus in 56 and 33%, respectively. The peak incidence of presentation is between the third and fifth decades of life. The most frequent symptoms are dysphagia and epigastric pain; in up to 50% of cases, patients remain asymptomatic, and the tumor is discovered by chance; however, on rare occasions, due to the size of the tumor and the areas of intratumoral necrosis of the lesion, it can debut with esophageal perforation and mediastinitis. Due to the rarity of this condition, the cases reported in the literature that address its surgical management are scarce. The treatment of this pathology can range from simple surgical enucleation to esophagectomy, with or without reconstruction of the gastrointestinal tract. This work aims to report a complicated esophageal leiomyoma clinical case and our experience managing a giant esophageal leiomyoma associated with esophageal perforation and mediastinitis. **Case report:** we present the case of a 54-year-old woman presenting signs and symptoms related to mediastinitis secondary to esophageal perforation due to a giant leiomyoma that had not been previously documented and required emergency surgical management by esophagectomy. **Conclusions:** esophageal leiomyoma is a rare oncologic entity that presents several diagnostic and therapeutic challenges. This tumor becomes even more challenging when this pathology presents with a complication, such as the case of mediastinitis. Prompt diagnosis and aggressive and timely treatment are the factors that have the most significant impact on the morbidity of the disease.

RESUMEN

Introducción: *los leiomiomas son los tumores benignos más frecuentes del esófago. Encontrados frecuentemente en el tercio inferior y medio del esófago en 56 y 33% respectivamente. El pico de incidencia de presentación se encuentra entre la tercera y quinta décadas de la vida. Los síntomas más frecuentes son la disfagia y el dolor epigástrico, hasta en 50% de los casos, los pacientes permanecen asintomáticos y el tumor se descubre por casualidad; sin embargo, en raras ocasiones por el tamaño del tumor debido a las áreas de necrosis intratumoral de la lesión, puede debutar con perforación del esófago y mediastinitis. Debido a lo raro de esta condición, los casos reportados en la literatura que abordan su manejo quirúrgico son escasos. El tratamiento de esta patología puede ir desde simple enucleación quirúrgica hasta una esofagectomía con o sin reconstrucción del tubo digestivo. El objetivo de este trabajo es reportar el caso clínico de leiomioma esofágico complicado, informando nuestra experiencia en el manejo de un leiomioma esofágico gigante asociado a perforación esofágica y mediastinitis.* ***Caso clínico:*** *se presenta el caso de una mujer de 54 años que presenta signos y síntomas relacionados con mediastinitis secundaria a perforación esofágica por un leiomioma gigante que no se había documentado previamente y que requirió manejo quirúrgico de urgencia mediante esofagectomía.* ***Conclusiones:*** *el leiomioma esofágico es una entidad rara oncológica, que presenta varios desafíos diagnósticos y terapéuticos. Esto se hace aún más desafiante al presentarse esta patología con una complicación, tal es el caso de la mediastinitis. El diagnóstico rápido y el tratamiento agresivo y oportuno son los factores que tienen mayor impacto en la morbilidad de la enfermedad.*

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Received: 05/16/2022
Accepted: 05/02/2023

How to cite: Reyes-Morales JM, Sánchez-Reyes K. Perforated esophageal leiomyoma. Management in a third level hospital. Cir Gen. 2023; 45 (2): 111-115. https://dx.doi.org/10.35366/111513

INTRODUCTION

Morgagni first described leiomyoma as a distinct gastrointestinal neoplasm in 1761, but Munro, in 1797, was the first to report a localized intramural leiomyoma of the esophagus.[1-3] Much of what is known today about the histologic features of esophageal leiomyoma was specified by Virchow in 1863.[4] Sauerbruch[5] reported the first successful surgical treatment of esophageal leiomyoma when he performed an esophageal resection with gastroesophagostomy in 1932. A year later, Ohsawa[6] performed the first successful surgical enucleation of this type of tumor. Leiomyomas are the most frequent benign tumors of the esophagus, accounting for 10% of all gastrointestinal leiomyomas.[7] It is usually found as a single lesion in the middle and lower third of the esophagus, with 33 and 56% presenting in these locations.[8] Leiomyoma can occur in patients of any age, but the peak incidence is between the third and fifth decades of life.[9] The most commonly used diagnostic methods are esophagogram, endoscopy, endoscopic ultrasound (EUS), and computed tomography (CT) scan. In the esophagogram, the classic appearance is a filling defect with a smooth and concave border with usual mucosal folds.[1,3] Endoscopy shows a mobile submucosal lesion with intact mucosa. Patients with esophageal leiomyoma usually have nonspecific symptoms such as dysphagia, epigastric pain, and weight loss. Perforation is a rare complication due to necrosis associated with the tumor and the size of the leiomyoma, predominantly in tumors larger than 10 cm in diameter.[10]

The indication for resection is based on symptoms, size (greater than 5 cm), and the existence of growth, ulceration, or malignant degeneration, which is rare. When the tumor is larger than 8 cm, adheres to the mucosa, or has extensive tearing of the mucosa during dissection, it may be necessary to resect part of the esophagus.

The objective of this work is to present the case of a giant esophageal leiomyoma that showed perforation and development of a clinical picture of mediastinitis, presenting our experience in the management of this pathology since the literature does not mention the percentage of perforation of this entity.

PRESENTATION OF THE CASE

This is the case of a 54-year-old woman with a history of systemic arterial hypertension of 16 years of evolution in medical treatment with losartan 50 mg every 24 hours in reasonable control, history of total abdominal hysterectomy 14 years ago for uterine myomatosis, laparoscopic cholecystectomy four years ago for chronic calculous cholecystitis, both without apparent complications. She started with 36 hours of evolution with significant chest pain, unquantified fever, and attack to her general condition, so she came to our unit for evaluation. When specifically interrogated, she mentioned a history of five years of symptoms characterized by dysphagia to the ingestion of solid food. Physical examination revealed a patient in poor condition with tachycardia of 120 beats per minute, hypotension of 90/60 mmHg, respiratory rate of 23 breaths per minute, temperature of 36.5 °C, and generalized pallor of the integuments. The auscultation of the chest on the right side revealed decreased breath sounds with dullness to percussion. Her abdomen was flat, soft, and depressible with increased vocal vibrations, with no evidence of peritoneal irritation. Laboratory tests showed hemoglobin 16.6 g/dl, hematocrit 49.68%, white blood cells 18 cells/mm^3, and neutrophils 89%. A thoracoabdominal tomography was performed, which showed a distal esophagus-dependent tumor associated with free fluid in the thorax and exit of contrast medium from the esophageal lumen *(Figures 1 and 2)*. Due to the clinical picture of esophageal perforation and mediastinitis, it was decided to submit the patient to surgical treatment.

A diagnostic right posterolateral thoracotomy was performed, documenting a tumor dependent on the esophagus in its distal third with perforation of the latter, so esophagectomy was performed resecting the distal end of the esophagus using a blue cartridge linear stapler *(Figure 3)*, with a subsequent longitudinal dissection of the esophagus. During a second surgical time, a left cervical approach was used to exteriorize the esophagus and prepare an

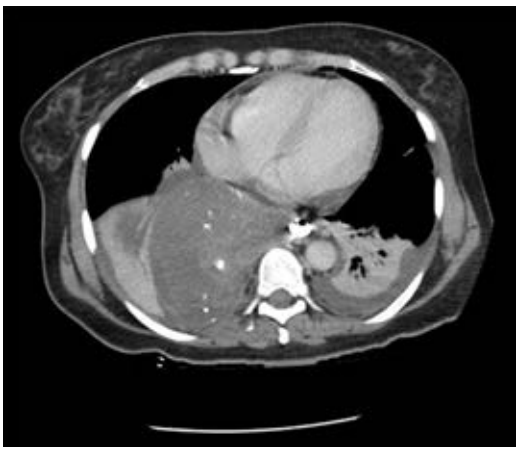

Figure 1: *Axial CT scan showing an esophageal-dependent tumor in the distal third of the esophagus.*

esophagostoma, maturing it with 2-0 polyglactin 910 stitches. The cervical and thoracic wound was closed by planes, the latter after placement of two endo pleural probes number 18 Fr. A third surgical stage was done for preparing a Witzel-type feeding jejunostomy. No drains were left in the abdominal cavity, and the patient left the operating room with medical treatment based on antibiotic therapy with meropenem 1 gram intravenously every eight hours. The patient had a favorable clinical evolution; the endo pleural tubes were removed on the second postoperative day, and a homemade diet was started through a jejunostomy tube. The patient was discharged on the fifth postoperative day.

Currently, the patient is under outpatient follow-up, with adequate tolerance of homemade feeding by jejunostomy tube, with a histopathological report of esophageal leiomyoma, so she is in a protocol for the reconstruction of the continuity of the digestive tract.

DISCUSSION

Esophageal leiomyoma is part of the subepithelial layer of esophageal tumors, arising from the smooth muscle of the esophagus, mainly from the *muscularis propria* and rarely from the *muscularis mucosae*.[11] It is considered the most common benign esophageal tumor. It primarily presents as a solitary intramural mass of oval, elongated, annular, horseshoe, or spiral shape surrounding the esophageal wall.[12] They are commonly found in the middle and lower third of the esophagus.

Dysphagia and dyspepsia are the most common symptoms since most tumors occur in the lower third of the esophagus, and leiomyomas larger than 5 cm in diameter are more likely to be symptomatic than smaller ones.[13] Our patient presented a tumor of 12 × 10 cm in diameter, which is considered in the world literature as a giant esophageal leiomyoma,[14] causing areas of necrosis in the tumor with the consequent perforation of the esophagus and a clinical picture of associated mediastinitis, requiring urgent surgical management; perforation of this tumor is extremely rare, and there is no incidence in the literature.

Mediastinitis is the inflammation of the connective tissue surrounding the mediastinal structures between the pleural spaces. Despite advances in intensive care, mediastinitis remains associated with high morbidity and mortality rates (over 40% approximately). Effective antibiotic therapy, intensive care management, elimination of the source of infection, and drainage of the affected mediastinal compartment are essential to effectively treating this pathology.[15]

Figure 2: *Coronal section of a tomography image showing the exit of the contrast medium from the esophageal lumen.*

Figure 3: *Esophageal tumor of solid aspect, measuring 12 × 10 cm, with free liquid (300 ml).*

An early diagnosis, the prompt establishment of initial treatment, and the performance of imaging studies, such as a thoracoabdominal computerized tomography scan for planning a surgical intervention, is essential to achieve an optimal result.[16] At the time of admission of the patient to the emergency department, supportive medical management was initiated to improve the patient's clinical conditions; such management consisted of intravenous solutions and the use of broad-spectrum antibiotics.

Imaging studies such as barium esophagogram, computerized tomography scan with oral contrast, esophagoscopy, and endoscopic ultrasound are helpful diagnostic tools in this pathology.[17] In the present case, the thoracoabdominal tomography revealed a large tumor originating in the lower third of the esophagus, which after administering an oral contrast medium, showed a perforation of this organ, requiring emergency surgery.

The gold standard surgical approach when dealing with this serious pathology is surgical drainage of the mediastinum.[18,19] In addition to controlling the source of contamination, since it is a perforated esophageal tumor, surgical resection of the tumor is necessary.[20] For optimal surgical drainage, several surgical approaches have been described in the literature, but due to this pathology, the best surgical approach is a posterolateral thoracotomy.

Several reconstruction techniques have been described in the literature, the most frequent being the gastric ascent with colon interposition. There has yet to be a consensus on the ideal reconstruction method after esophagectomy. Given the unstable hemodynamic conditions due to mediastinitis, we did not choose to reconstruct the gastrointestinal tract using these techniques, leaving this reconstruction for a second surgical stage.

The main complications of mediastinitis are sepsis[21] and thoracic empyema. In our case, the patient had a favorable postoperative course with no complications, responding adequately to surgical management and broad-spectrum antibiotics. Despite advances in recent years, mediastinitis continues to be a disease with a mortality rate close to 40-50%. The prognosis depends on the extent of the infection and the general condition of each patient, as well as their comorbidities; however, timely diagnosis and aggressive treatment are the main factors to improve the evolution of the disease.

As for leiomyomas, they have a good prognosis with no tendency for recurrence.[22] Most series report successful resection with open or minimally invasive approaches without any perioperative morbidity or mortality.[23]

CONCLUSIONS

Esophageal leiomyoma is a rare oncologic entity that presents several diagnostic and therapeutic challenges. Therefore, it is important to have a detailed clinical history and complementary diagnostic imaging studies, such as chest X-ray and CT scan, to assess the extent of the disease and decide on the surgical approach based on the results.

Rapid diagnosis and aggressive and timely treatment are the factors that have the most significant impact on the morbidity of the disease.

ACKNOWLEDGMENTS

The authors would like to thank all the staff of physicians and residents of the Gastro Surgery

Service of the *Hospital de Especialidades del Centro Médico Nacional Siglo XXI, Instituto Mexicano del Seguro Social*, for their contribution to this paper.

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Ethical considerations and responsibility: data privacy. According to the protocols established in our work center, we declare that we have followed the protocols on patient data privacy and preserved their anonymity.

Funding: no financial support was received for the preparation of this work.

Disclosure: none of the authors have a conflict of interest in the conduct of this study.

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CLINICAL CASE
doi: 10.35366/111514

Cirujano General
April-June 2023
Vol. 45, no. 2 / p. 116-119

A clinical case of a gallstone spontaneous expulsion in a patient with biliary ileus seen at the General Hospital of Manzanillo, Colima

Caso clínico de expulsión espontánea de lito en paciente con íleo biliar. En Hospital General de Manzanillo, Colima

César Alejandro López-Romero,* Juan Manuel Gómez-Rodríguez,* Antonio Romero-Nogales‡

Keywords:
biliary ileus, litho, intestinal obstruction.

Palabras clave:
íleo biliar, lito, obstrucción intestinal.

ABSTRACT

Biliary ileus is an uncommon complication of cholelithiasis and occurs in only 0.3-0.5% of patients with biliary pathology; it is described as a mechanical intestinal obstruction due to the impaction of one or more gallstones within the gastrointestinal tract. The stone reaches the intestine via a cholecystoenteric fistula. The most frequent type of fistula is between the gallbladder and the duodenum. Due to the lack of suspicion of this condition, the diagnosis is made with exploratory laparotomy in 50% of the patients. Most of the literature recommends surgical and resolutive management of the obstructive condition; however, there is only one case report in India of spontaneous evacuation.

RESUMEN

El íleo biliar es una complicación poco común de la colelitiasis y sólo se presenta en 0.3-0.5% de los pacientes con patología biliar, descrito como una obstrucción intestinal mecánica debida a la impactación de uno o más cálculos biliares dentro del tracto gastrointestinal. El lito llega al intestino por medio de una fístula colecistoentérica. El tipo de fístula más frecuente se localiza entre la vesícula biliar y el duodeno. Debido a la falta de sospecha de este padecimiento, el diagnóstico se realiza con laparotomía exploradora en 50% de los pacientes. La mayoría de la bibliografía recomienda tanto manejo quirúrgico como resolutivo del cuadro obstructivo; sin embargo, sólo existe hasta el momento un reporte de caso de evacuación espontánea en la India.

INTRODUCTION

Biliary ileus was first described in 1654 by Erasmus Bartolim in a necropsy study.[1] It is caused by the passage of a gallstone from the bile ducts into the intestinal lumen through a fistula. The most frequent type of fistula is between the gallbladder and the duodenum. The fistula appears when there are recurrent episodes of acute cholecystitis, generating extensive inflammation and adhesions between the gallbladder and the digestive tract.[2] This pathology represents 1 to 4% of the causes of mechanical occlusion of the small intestine in patients under 65.[3] This entity occurs more frequently in patients older than 65 years and has a prevalence of up to 25% as a cause of occlusion in this age group.[4] This entity occurs more frequently in patients older than 65 years and has a prevalence of up to 25% as a cause of occlusion in this age group.[5] It predominates in the female gender with a ratio of 3.5-6.1:1.[6] Diagnostic suspicion is of utmost importance for timely management. In a review of Japanese literature, it was reported by Kashara and collaborators that only eight out of 112 patients presented spontaneous passage of litho in the gastrointestinal tract.[7]

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Received: 05/17/2022
Accepted: 05/02/2023

How to cite: López-Romero CA, Gómez-Rodríguez JM, Romero-Nogales A. A clinical case of a gallstone spontaneous expulsion in a patient with biliary ileus seen at the General Hospital of Manzanillo, Colima. Cir Gen. 2023; 45 (2): 116-119. https://dx.doi.org/10.35366/111514

PRESENTATION OF THE CASE

We present the case of a 58-year-old woman from Tequesquitlan, Jalisco, living in Manzanillo, Colima. She came to the emergency department for clinical symptoms of eight days of evolution characterized by pain in the epigastrium 9/10 on the visual analog scale, stabbing type accompanied by nausea that progresses to vomiting of gastrobiliary content, bowel movements, and flatus present. Management with antacids was initiated by a private physician prior to admission to the emergency room without improvement of symptoms. Physical examination showed relevant findings of abdominal distension with pain on superficial and deep palpation located in the epigastrium and mesogastrium, generalized tympanic movement, and decreased peristalsis. No muscle resistance or peritoneal irritation was found at the time of admission. She is allergic to dextromethorphan and penicillin. She denies any history of abdominal pain suggestive of cholecystitis. Chronic degenerative diseases and surgeries were also denied. Her lab tests showed white blood cells 18.13 × 10^3/milliliters, with neutrophils 15.56 × 10^3/milliliters, lymphocytes 1.44 × 10^3/milliliters, hemoglobin 11.60 grams/deciliters, hematocrit 34.60%, platelets 359 × 10^3/milliliters, creatinine 0.60 milligrams/deciliters, urea nitrogen 8.6 milligrams/deciliters, urea 18.5 milligrams/deciliters, sodium 138 mEq/l, potassium 3.3 mEq/l, and chlorine 104 mEq/l. A computed axial tomography scan with oral contrast material was performed, finding gallbladder with contrast material coming from duodenum showing anomalous communication between both structures concerning a fistulous tract at the level of the second portion of duodenum, bowel loops associated to multiple hydro-aerial levels secondary to a 24 millimeters litho in the distal ileum at 40 centimeters from the ileocecal valve with distention of loops proximal to this site *(Figure 1)*. A nasogastric tube was placed on the first day of hospital admission with an output of 1,400 cubic centimeters in the first 24 hours.

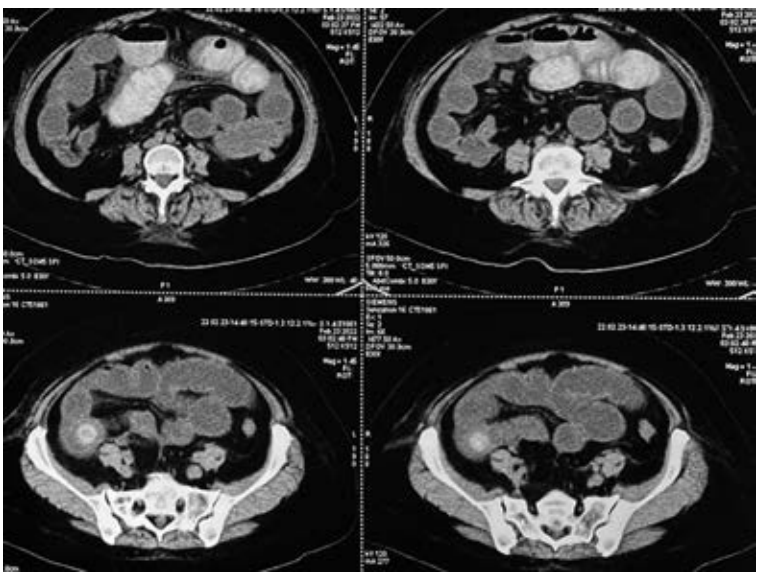

Figure 1: *Axial CT scan showing a 24 mm litho at the level of the distal ileum.*

On her second and third days of hospital stay, the patient did not present bowel movements or flatus and was accompanied by significant abdominal distention and generalized tympanic movements. However, there was no evidence of peritoneal irritation.

It was decided to send the patient to a high specialty hospital due to the high complexity of the pathology; this was done on two occasions during his second and third days of hospital stay, stating that they could not accept the patient due to the high demand of hospitalized patients. Because of the worsening clinical picture, we decided to intervene using exploratory laparotomy during his fourth day of stay.

Before her surgery, she reported liquid stools accompanied by a gallstone, confirmed by the nurse and the patient.

She then underwent exploratory laparotomy, which revealed a scleroatrophic gallbladder with multiple omentum adhesions and a 5-millimeter fistula connecting the gallbladder to the second portion of the duodenum *(Figures 2 and 3)*. A systematic review of the entire intestine was performed in search of residual lithiasis without finding their presence. Therefore, a longitudinal enterolithotomy was not performed. Primary fistula closure was performed in two planes with Connel-Mayo stitches with 2-0 polypropylene and Lembert stitches with 2-0 silk *(Figure 4)*. Subsequently,

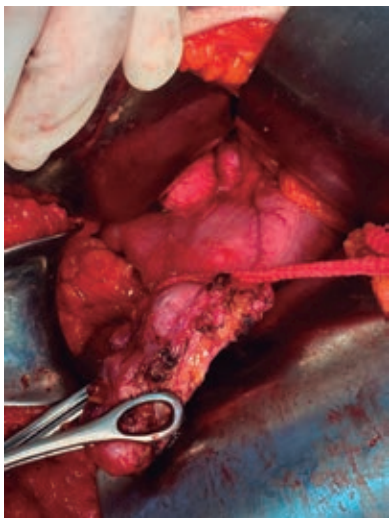

Figure 2: *Gallbladder attached to the second portion of the duodenum with scleroatrophic appearance.*

cholecystectomy was performed, and the cavity was closed in planes without placing any drainage.

The patient had a good clinical evolution after surgery with Bristol 6-type bowel movement on the second postoperative day. A liquid diet was started 72 hours after surgery with adequate tolerance. Due to the favorable evolution without complications, her hospital discharge was decided.

One week later, she went to the general surgery outpatient department, without complications, without data of surgical site infection, and with good tolerance to diet and bowel movements present. The histopathological results of the surgical specimen showed chronic cholecystitis, cholecystolithiasis, and fibrotic areas suggestive of scleroatrophy and negative for malignancy.

DISCUSSION

Biliary ileus is a rare complication of vesicular lithiasis corresponding to 0.3-0.4%; the most frequent mechanism of a litho passage is through a vesicular-duodenal fistula, the same situation presented by our patient. This clinical case of biliary ileus corresponds to an unusual presentation since the age of the case is below 65 years, which corresponds to less than 4% of the incidence of this pathology, according to the literature cited in this publication. A calculus larger than 2 cm in diameter generates obstruction at the small bowel level in 90% of the cases,[2] in agreement with ours, where a 24 mm stone was documented by computed axial tomography (CAT) scan and was responsible for the occlusive picture at the beginning of the disease; however, the spontaneous expulsion of the stone in the feces stands out. The few documented cases of spontaneous expulsion of the stone in the biliary ileus are worth noting, which makes our case report an infrequent resolution of the biliary ileus. Only eight cases of 112 cases with spontaneous resolution have been reported in the Japanese literature. There is still controversy about the management of biliary ileus. However, most of the literature agrees that surgical management remains the treatment of choice in all reported cases, recommending enterolithotomy with stone extraction, followed by cholecystectomy and fistula repair. In this case, a single-stage surgery was performed since it offers the advantages of avoiding future complications, such as gallbladder carcinoma in 15%, cholecystitis or cholangitis, or recurrence of obstructive symptoms.[6]

CONCLUSIONS

Establishing an early diagnosis of biliary ileus helps us prevent complications secondary to

Figure 3: *Enterobiliary fistula of approximately 5 mm in length.*

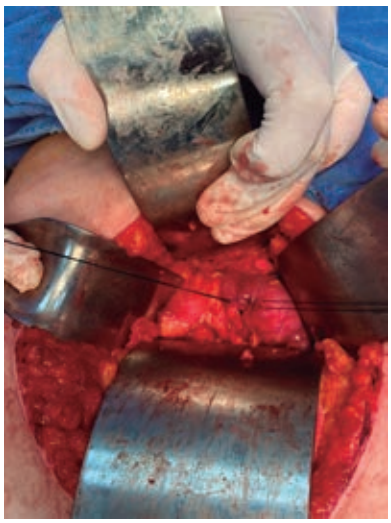

Figure 4: *Primary closure of the fistula over the second portion of the duodenum.*

an obstructive condition at the intestinal level using imaging studies. The best study will always be a computerized tomography scan reinforced with contrast material because it has a sensitivity over 90% compared to other studies. The treatment will always be surgical and mainly aimed at resolving the obstruction with an enterotomy and extraction of the calculus. Subsequently, the bilioenteric fistula causing the arrival of the stone to the intestinal lumen will have to be repaired to prevent subsequent cases of biliary ileus and reduce the risk of biliary vesicular cancer secondary to the reflux of gastrointestinal contents into the gallbladder through this communication.

ACKNOWLEDGMENTS

We thank Dr. Francisco Martínez Rosales, Education Chief of our hospital, and the Chief of the General Surgery Service Dr. Antonio Romero Nogales, for making this case report article possible.

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Funding: no financial support was received for the preparation of this work.
Disclosure: none of the authors have a conflict of interest in the conduct of this study.

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doi: 10.35366/111515

Cirujano General
April-June 2023
Vol. 45, no. 2 / p. 120-124

The birth of a State College of Surgeons, history of the Medical College of Specialists in General Surgery of the State of Michoacán, A.C.

El nacimiento de un Colegio Estatal de Cirujanos, historia del Colegio Médico de Especialistas en Cirugía General del Estado de Michoacán, A.C.

Javier Carrillo-Silva*

Keywords:
history, college, general surgeons, general surgery.

Palabras clave:
historia, colegio, cirujanos generales, cirugía general.

ABSTRACT

The Medical College of Specialists in General Surgery of the State of Michoacán, A.C. has the antecedent that more than 50 years ago, a group of great master surgeons from Michoacán formed the "College of Surgeons of Michoacán" whose members were general practitioners and specialists in various branches; however, the general surgeons of Michoacán did not have a legally constituted college, so 26 years ago a group of eight general surgeons founded the Medical College of Specialists in General Surgery of the State of Michoacán, A.C. However, due to the Law of Professions of the State of Michoacán, they could not grant us the corresponding registration, until 2016 when the Law of Professions in the State of Michoacán was modified. They registered us to affiliate with the Mexican Federation of Colleges of General Surgery, A.C.

RESUMEN

El Colegio Médico de Especialistas en Cirugía General del Estado de Michoacán, A.C. tiene el antecedente que, hace más de 50 años un grupo de grandes maestros médicos cirujanos originarios del estado formaron el "Colegio de Cirujanos de Michoacán" cuyos integrantes eran médicos generales y especialistas de diversas ramas. Sin embargo, los cirujanos generales de Michoacán no tenían un colegio legalmente constituido, por lo que hace 26 años un grupo de ocho cirujanos generales fundaron el Colegio Médico de Especialistas en Cirugía General del Estado de Michoacán, A.C. No obstante, debido a la Ley de Profesiones del Estado de Michoacán no les podían otorgar el registro correspondiente, hasta que en el año de 2016 se modificó esta ley y les otorgaron el registro que permitió afiliarse a la Federación Mexicana de Colegios de Cirugía General, A.C.

INTRODUCTION

In the state of Michoacan, for many decades, general surgeons met with various surgical specialists around a "College of Surgeons of Michoacán" that lacked official registration by an old Law of Professions that did not allow the registration of a new college. Twenty-six years ago, we founded the "*Colegio Médico de Especialistas en Cirugía General del Estado de Michoacán, A.C.*", a group of eight general surgeons from Michoacán, with Dr. Javier Carrillo-Silva as president *(Figure 1)*; however, we were able to obtain the registration before professions until the law changed, twenty years later, with which the affiliation to the *Federación Mexicana de Colegios de Especialistas en Cirugía General A.C.* (FMCECG) was obtained.

As a background of the college, that great master surgeons from Michoacán more than fifty years ago were concerned about trying to have an organization that grouped surgeons with the sole purpose of sharing knowledge

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Received: 06/12/2022
Accepted: 05/02/2023

How to cite: Carrillo-Silva J. The birth of a State College of Surgeons, history of the Medical College of Specialists in General Surgery of the State of Michoacán, A.C. Cir Gen. 2023; 45 (2): 120-124. https://dx.doi.org/10.35366/111515

and experiences, forming the "*Colegio de Cirujanos de Michoacán*". However, the members were both general practitioners and physicians of various specialties such as general surgeons, orthopedic surgeons, obstetricians, and gynecologists, and other. Many of them are already deceased and other fellow surgeons, including myself, participated in the activities of this group with great enthusiasm, either as speakers or assistants, and even congresses were organized with the participation of the Mexican Association of General Surgery, both in the capital Morelia and in various cities of our state of Michoacán. All this work was developed for a little more than half a century, regardless of not having an official registration by the Directorate of Professions of the State of Michoacán; by virtue of the fact that the law dating back to 1948 only allowed the existence of two colleges per profession in the state of Michoacán and during that time only two associations were officially recognized, which were the Medical College of Ciudad Hidalgo and the Medical College of Michoacán. Even so, we continued to gather around this "College of Surgeons of Michoacán" that at the end of the road and for the same reason, they were forced to change the name of "College" to "Association": all of us who participated and lived this old college consider it as the father of our current college.

Figure 1: *Dr. Javier Carrillo Silva, FACS.*

In 1973, the Mexican Association of General Surgery A.C. (AMCG), a national organization that brings together all general surgeons in the country, and later the Mexican Federation of Colleges of Specialists in General Surgery A.C., which brings together all the colleges in the country and groups all the colleges of the country were founded. But the general surgeons of Michoacán did not have a legally constituted college to affiliate to this federation. So, 26 years ago and after attending a congress in the city of Patzcuaro, Michoacán where we exchanged views with Dr. Humberto Arenas Marquez, at that time vice president of the AMCG, about the conformation of the colleges in the country, persuaded me to found the college composed exclusively of general surgeons, so we could be an Incorporated Society of the AMCG (remember that there was not yet the Mexican Federation of Colleges of General Surgery), so I took on the task of gathering the general surgeons who wished to form the new college and thus a group of eight general surgeons legally formalized the founding of the Medical College of Specialists in General Surgery of the State of Michoacán, A.C. before a notary public and with the permission of the Ministry of Foreign Affairs. The first board of directors was composed as follows: president Dr. Javier Carrillo-Silva, vice president Dr. Luis Tapia-Amezcua, secretary Dr. Adán Lachino-Martínez (deceased), assistant secretary Dr. Arturo Villanueva-Chávez, treasurer Dr. Julio Villeda-Lemus, pro-treasurer Dr. Julio César Moreno-Sánchez, and members Dr. Luis Felipe Maciel Moreno and Dr. Juan Sergio Pérez Zuno.

The AMCG issued us a certificate of incorporation in November 1996. However, due to the Law of Professions of the State of Michoacán, which had governed us since the forties, they could not grant us the corresponding registration, so we stopped attending the AMCG meetings. Therefore, this deed was kept for twenty long years! In 2016, fortunately, the Law of Professions in the State of Michoacán was modified. Finally, the important part of those changes was that the power was added to have the legal consent to register two colleges per specialty.

It is also convenient to mention that Dr. Julio Cesar Moreno-Sanchez continued during those years attending meetings both in the Directorate of Professions and in the Mexican Association of General Surgery as a guest of the former College or Association, so much so that he actively participated in promoting the change of the Law of Professions before the Health Commission of the State Chamber of Deputies; he had timely knowledge about the change of the Law of Professions, as well as that the Assembly of the FMCECG was approaching, in which the issue of who would represent the State of Michoacán would be discussed, so he contacted the author five days before the assembly, which motivated us to go to the offices of the Directorate of Professions the following day, where we were attended by the C. Lucila Martínez-Manríquez and in a very kind manner she told us what documents were required to process and obtain the official registration, which we did in the term of three days and precisely the day before the assembly, at 22:00 hours of July 15, 2016, she gave us the official document stating the registration of our College, finally obtained in record time!, meaning the documentation that supported the legal foundation of our College. Hours later, at 4 a.m. the next day, we moved by land from our place of residence, Morelia, to Mexico City to be present and on time at the Assembly of the FMCECG on Saturday, July 16, 2016, where Dr. Julio César Moreno-Sánchez was presented as a guest of the FMCECG on behalf of the State of Michoacán, a General Surgeon who came representing the College of General Surgeons of the Zamora Valley, and the author of this paper as representative of our current College. The three of us were required to show the document of the registration of the College before the Directorate of Professions, which only we could accredit it since we were the only ones who had such registration, so the assembly decided that our Medical College of Specialists in General Surgery of the State of Michoacán, A.C. could continue with the affiliation procedures to the Mexican Federation of Colleges of Specialists in General Surgery, presided at that time by Dr. Héctor Noyola-Villalobos.

The affiliation was obtained thanks to the support received by Dr. Héctor F. Noyola-Villalobos, Dr. Ignacio Magaña-Sánchez, Dr. Juan Luis Cerda-Cortaza, Dr. Eduardo Moreno-Paquentín, and Dr. Elena López-Gavito on November 2, 2016.

Finally, on March 3, 2017, Dr. Eduardo Moreno-Paquentín swore in the board of directors of our college.[1]

For the Medical College of Specialists in General Surgery of the State of Michoacán A.C. is a great responsibility to fulfill its primary objective, which is continuing medical education, so we set out to conduct monthly update sessions with a high academic level and to achieve this, we invited great surgeons of the country to come to our city to share their knowledge and experiences, which in addition to fulfilling the academic objective of updating, we showed them the beauty of our city and the beautiful state of Michoacán.

Many professors shared their knowledge. It was possible to testify how they skillfully applied this knowledge acquired in their hospitals of the city and other smaller locations all over the state, translating into a direct benefit for patients. We acknowledged the management of negative pressure therapy by Dr. Obed Villanueva in very complicated patients in Zitacuaro. We also testified to the moment Dr. Gloria Avila "kidnapped" a speaker and took him to operate a complicated case of a patient in her hospital. At the same time, we waited for them for several hours in the parking lot until the surgery ended.

When Dr. Eduardo Moreno-Paquentín made us take the oath to the board of directors, Dr. Luis Felipe Maciel-Moreno, a founding member of our College, reminded us that in 1984 was held in Morelia the National Congress of the AMCG chaired by Dr. Jorge Cervantes-Castro (deceased) and the same Dr. Maciel served as local organizer. Dr. Eduardo Moreno-Paquentín asked us if we wanted to make a Regional Congress and all members reacted positively, and once it was our turn to organize it within the role of regional meetings for 2018. We carried it out with the support of the AMCG and the FMCECG as well as with the extraordinary work and

financial support that we did to the college to cover expenses, the congress participants who visited us were able to listen to excellent speakers, learned about and enjoyed the colonial, cultural and artistic richness of our beautiful state of Michoacán, in addition to listening to excellent speakers.

We have the support of the Faculty of Medical and Biological Sciences "Dr. Ignacio Chavez" belonging to the *Universidad Michoacana de San Nicolas de Hidalgo*. To meet our academic objective, we invited world-renowned foreign professors such as Dr. Gustavo Carvalho from Recife, Brazil, who preferred to come to our meeting instead of the SAGES Congress in the United States; we also had two professors from Spain, Dr. Gonzalo P. Martin-Martin, and Dr. Jose Maria Muñoz-Perez.

To complete the objective, we invited the best surgeons in our country of great international renown. However, due to the short duration of the congress, we could only invite less people that would have liked to. Among the speakers, we had Dr. Héctor F. Noyola-Villalobos, Dr. Mario Vilatobá-Chapa, Dr. Miguel Ángel Mercado-Díaz, Dr. Ismael Domínguez-Rosado, Dr. Adolfo Cuendis-Velázquez, Dr. Juan Roberto Torres-Cisneros, Dr. Vicente González-Ruíz, Dr. Fernando Cerón-Rodríguez, Dr. Carlos San Juan, Dr. Miguel Ángel Rivera, and Dr. Juan Roberto Torres Cisneros. Also, Dr. Luis Juan Cerda-Cortaza, Dr. Sergio Lee-Rojo, Dr. Stefano Sereno-Trabaldo, Dr. Luis Francisco Gómez-Hermosillo, Dr. Ignacio del Río-Suárez- and Dr. Felipe F. Ulloa- Ruiz attended the meeting. We had 864 attendees, many of them students from our University of Michoacan, as well as surgeons from the interior of the state and our country. It was also very satisfying to learn that the promotional video of congress[2] finally had 3,600 views on the Facebook page of the AMCG. Also, we prepared a video mapping in the esplanade of San Francisco, a welcome cocktail at the Palacio Municipal with the participation of the chorus Niños Cantores de Morelia, as well as a concert at the Teatro Ocampo of the Symphony Orchestra of the state of Michoacan and a classical ballet, all this testimony photographic and video was fully sponsored by the AMCG.[3]

Fortunately, we could rent commercial booths and, with the proceeds from the Congress, we had the opportunity to purchase products promoted at these sites and raffle them among the Congress attendees.

We have signed an agreement with the Directorate of Professions so that our association could endorse the issuance of temporary professional licenses to recently graduated surgeons who are only waiting for their degrees to be delivered to practice their specialty in our state. Our association knows that when the recently graduated surgeon usually does not have a job, they are not charged for this procedure.

The SARS-CoV-2 virus pandemic arrived, and by law and we had to suspend all the face-to-face sessions, as well as the elections of a new Board of Directors of our College, until November 2021, calling for elections in faithful compliance with our bylaws, being elected as president: Dr. Julio Villeda-Lemus and conforming the new board of directors the following: vice-president: Dr. Julio César Moreno-Sánchez; Treasurer: Dr. Marte Alberto Villafuerte-Arreola; Pro-Treasurer: Dr. Ricardo González-González; Secretary: Dr. Adriana Castillo-Frausto; Pro-Secretary: Dr. Bernardino Alcaraz-López; Members: Dr. Alejandro Constantino-Hernández, Dr. Cuauhtémoc Lemus-Castillo, Dr. Óscar Obed-Villanueva Soto, Dr. José Guadalupe Ortiz-Jiménez, Dr. Marleny Urtiz-Paz, and Dr. Jorge Chávez-Carrillo.

We leave the baton of a Medical College of Specialists in General Surgery of the State of Michoacán, legally constituted, with documentation in order and healthy finances.

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Funding: no financial support was received for the preparation of this work.

Disclosure: the author has no conflict of interest in the conduct of this study.

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Contents