VOL. 06 Nº 18 - FEBRUARY 2026

SCIENTIFIC JOURNAL

CEREM-GO

ISSN 2675-5009

CEREM-GOIÁS
Comissão Estadual de Residência Médica de Goiás

CIP - Brasil - Catalogação na Fonte
Dartony Diocen T. Santos CRB-1 (1° Região)3294

S416 **Scientific Journal CEREM-GO: State Medical Residency Commission from Goiás. / Goiana Medical Residency Association.**
V.06, n. 18. – Goiânia:. D&D Communication Ltda, 2025.

75p. : il. (Editions February)
ISSN:2675-5009

1.Magazine. 2.Surgery. 3.Illness. 4.Complication 5. Medicine. I.Título.

CDU: 616(52) =111

Printed in Brazil – 2025

Índice para catalogo sistemático

CDU: 616(52) =111

EDITORIAL TEAM

PUBLICATION RULES

The journal will accept original material for publication in the field related to ultrasound. The journal will publish:

1. Full original articles, whether prospective, experimental or retrospective.

2. Case reports of great interest as long as they are well documented clinically and laboratory.

3. Special issues with annals, collections of works presented at Scientific Journal CEREM-GO and supplements with works on a topic of great interest.

4. Review articles, including meta-analyzes and editorial comments, upon invitation, when requested to members of the editorial board.

PROCESSING

All material sent will be analyzed by the Editorial Board of the journal composed by: editors of the magazine and the journal, editorial board, associate editors, collaborators and assistants; being prohibited the identification to the reviewers of the authors or the service where the works were developed. At the same time, the reviewers will not be identified by the authors, except when requested by those. Upon receipt, the articles will be dated and coded and their authors will be notified of receipt. Articles that do not meet the editorial standards will be rejected at this stage. Those which meet the requirements will be sent to two reviewers appointed by the Editor. Authors will be informed of the acceptance and of any changes eventually suggested by the Editorial Board. When modifications are requested, the authors must return the corrected work within 15 days, and must justify if any suggestions are not accepted.

COPYRIGHT

It is a condition of publication in which the authors transfer the copyright of their articles to the Sociedade Brasileira de Ultrassonografia (Brazilian Society of Ultrasonography) (SBUS). The transfer of copyright to the journal does not affect the patent rights or agreements related to the authors. Figures, photos or charts from other publications may be reproduced, provided they are authorized by the owner. The published material becomes property of SBUS and can be reproduced with its consent.

ETHICAL ASPECTS

The Editorial Board follows the principles of the Declaration of Helsinki and we recommend that the authors of the submitted articles obey the ethical commission and fulfill the regulatory and legal requirements for experiments on human beings with drugs, including informed consent, according to the necessary procedures in their institution or country. All patient information must be anonymous, especially checking that the patient's identification number and name have been removed from the ultrasound photos. For further details, access the ethics and research commission website (http://www.datasus. gov.br/conselho/comissões/ética/conep.htm).

AUTHORITY AND RESPONSIBILITY

The intellectual content of the works is the sole responsibility of their authors. The Editorial Board will not assume any responsibility for the opinions or statements of the authors. Every effort will be made by the Editorial Board to avoid incorrect or inaccurate data. The number of authors must be limited to six.

SUBMISSION OF ARTICLES

Authors will send copies together with sets of figures, photos or tables and keep a copy for reference. The text must identify an author as the correspondent to whom the journal's notifications will be sent. It must contain the full name, institution, unit, department, city, state, country, link to CV Lattes, ORCID number of all authors and full address, telephone and email of the person responsible for the work.

Papers should be sent to revistacientificacerem@gmail.com

PRESENTATION

Articles must be typed in double space and must contain the following topics:

Title (Portuguese and English), abstract (Portuguese and English), introduction, methods, results, discussion, acknowledgments and references. Each topic must start on a new page. Case reports should be structured in: summary, introduction, case report, discussion, conclusion and references. The first page should include: title, first and last name of the authors and their affiliation, titles (no more than 20 letters), keywords (5-8) and the email address. The second page must contain the title of the manuscript in the header and care must be taken in the rest of the text so that the service or the authors cannot be identified (delete them).

ABSTRACT

The summary of the original articles should be divided into sections containing information that allows the reader to have a general idea of the article, being divided into the following topics: objectives, methods, results and conclusions. It should not exceed 250 words. The summary of case reports should be in a single paragraph. An English version of the abstract and key words must be provided.

STYLE

Abbreviations must be in capital letters and periods after the letters must not be used, for example US and not U.S.. Statistical analyzes must be detailed in the topic referring to the methods. Footnotes will not be allowed, except in charts. The Editorial Board reserves the right to alter the manuscripts whenever necessary to adapt them to the journal's bibliographic style.

CITED LITERATURE

References should be numbered consecutively as they appear in the text and then in figures and charts if necessary, cited in superscript numerals, ex: "Recent work on the effect of ultrasound 22 shows that ....". All references must be cited at the end of the article following the information below: 1. et al. is not used. All authors of the article must be cited. 2. Medical journal abbreviations must follow the Index Meddicus format. 3. Unpublished works, articles in preparation or personal communications should not be used as references. When absolutely necessary, only cite them in the text. 4. Do not use articles that are of difficult access or restricted to readers, preferring the most relevant or recent ones. In the original articles, the reference number must be limited to 25 and case reports and letters to 10. 5. The accuracy of the reference data is of responsibility of the authors.

References should follow the Vancouver style as in the examples below: Journal articles: Cook CM, Ellwood DA. A longitudinal study of the cervix in pregnancy using transvaginal ultrasound. Br J Obstet Gynaecol 1966; 103:16-8.

In press: Wyon DP. Thermal comfort during surgical operations. J Hyg Camb 20-; in press (put the current year).

Edited book article: Speroff L, Glass RH, Kase NG. In Mitchell C, ed. Clinical Gynecologic

Endocrinology and Infertility. Baltimore, USA: Willliams & Wilkins, 1994:1-967.

ACKNOWLEDGMENTS

Aimed at the scientific or material contributions of others that do not justify co-authorship.

ILLUSTRATIONS

All illustrations must be identified with the name of the main author and figure number. All illustrations must be cited in the text and numbered according to their appearance, eg figure 3.

INDEX

6 **TUBERCULOUS LIVER ABSCESS IN AN IMMUNOCOMPETENT PATIENT: A CASE REPORT**

AMANDA FIGUEIREDO GARCIA, JORDANA SILVA DIAS, TATIELE BARBOZA DOS REIS GOMES

14 **COLONOSCOPIC FINDINGS IN A PRIVATE CLINIC IN GOIÂNIA**

ISABELLE PINA DE ARAÚJO, MICAEL BATISTA RIBEIRO SANTOS, ANA LUIZA NAVES PRUDENTE3, NATÁLIA RIBEIRO SILVÉRIO, ISABELA COSTA MONTEIRO, AMÉRICO DE OLIVEIRA SILVÉRIO

23 **FROM ALCOHOLIC LIVER CIRRHOSIS TO HEPATIC STEATOSIS: AN EPIDEMIOLOGICAL PROFILE FROM 2010 TO 2025**

LUDYMILLA DE OLIVEIRA PORTILHO LACERDA, AMÉRICO DE OLIVEIRA SILVÉRIO, STANLEY JAMES FANSTONE PINA

38 **SURGICAL DRAINAGE OF A CUTANEOUS ABSCESS IN PATIENT WITH MULTIPLE SCLEROSIS AND EHRLES-DANLOS SYNDROME: A CASE REPORT**

THAIS LIMA DOURADO, GUSTAVO SIQUEIRA ELMIRO, BRUNO ALVES RODRIGUES, GIULLIANO GARDENGHI

43 **DESCRIPTION OF CLINICAL CHARACTERISTICS, DIAGNOSTIC CRITERIA AND MANAGEMENT OF INFECTIOUS ENDOCARDITIS IN A TERTIARY HOSPITAL IN GOIÁS: AN 11-MONTH RETROSPECTIVE STUDY**

GABRIELLA TORRANO CARVALHO PIMENTEL, LUCIANA FERNANDES BALESTRA, GIULLIANO GARDENGHI

55 **PREVALENCE OF PREVIOUSLY UNDIAGNOSED HEART DISEASE IN PATIENTS ADMITTED WITH ACUTE ISCHEMIC STROKE TO AN EMERGENCY HOSPITAL IN GOIÁS**

FREDERICO PORTO LUCIANO COIMBRA, LUCIANA FERNANDES BALESTRA, GIULLIANO GARDENGHI

64 **CLINICAL RELEVANCE OF CONGENITAL POSTERIOR CIRCULATION VARIANTS IN EXERCISE-INDUCED HEADACHE: A CASE REPORT**

CECÍLIA LIMA GARCIA, JERÔNIMO DE ASSIS GARCIA NETO, ANA MARIA RAGANINI DALMASO, GUILHERME ARRUDA VILELA, JOSÉ MARTINS DE SOUZA NETO, LUÍS HENRIQUE DA SILVA LIMA

CONTINUOUS IMPROVEMENT

We are pleased to announce the beginning of the work for the first 2026 edition of the CEREM Goiás Scientific Journal, scheduled for completion in February.

More than just a space for dissemination, our publication is a tool for strengthening medical training, promoting the serious and transparent sharing of scientific work developed by medical residents and residency programs throughout the state.

In this way, we contribute to valuing research, encouraging academic production, and fostering the continuous improvement of medical practice.

Be part of the pages that share knowledge, inspire new practices, and highlight the importance of medical residency in Goiás.

Submit your articles to revistacientificacerem@gmail.com or through the link: https://revista.ceremgoias.org.br/index.php/CEREM/about/submissions

WALDEMAR NAVES DO AMARAL
TÁRIK KASSEM SAIDAH
EDITORES CHEFES

SCIENTIFIC JOURNAL
CEREM-GO
DOI 10.37951/2675-5009.2025v6i18.182
ISSN 2675-5009
e25182
SCIENTIFIC ARTICLE - CASE REPORT

TUBERCULOUS LIVER ABSCESS IN AN IMMUNOCOMPETENT PATIENT: A CASE REPORT

AMANDA FIGUEIREDO GARCIA[1], JORDANA SILVA DIAS[2], TATIELE BARBOZA DOS REIS GOMES[2]

1. Resident at the Federal University of Jataí, Jataí/GO, Brazil
2. Undergraduate student at the Federal University of Jataí, Jataí/GO, Brazil.

ABSTRACT

An immunocompetent male patient presented with severe pain in the right upper quadrant and fever ranging from 39 to 40 °C. Initial laboratory findings were nonspecific. Contrast-enhanced abdominal computed tomography revealed a hepatic abscess, for which videolaparoscopic drainage and collection of purulent material were performed. Culture identified Mycobacterium tuberculosis, and the Rapid Molecular Test for Tuberculosis (TRM-TB) was positive, demonstrating rifampicin sensitivity and confirming the diagnosis of hepatic tuberculosis. The patient was started on standard antituberculous therapy, showing progressive clinical improvement and being discharged after 21 days. This case highlights the diagnostic challenge of extrapulmonary tuberculosis in immunocompetent individuals and emphasizes the importance of including this etiology in the differential diagnosis of hepatic abscesses, particularly in endemic regions.

Keywords: Colonoscopy, Hepatic tuberculosis, Liver abscess, Extrapulmonary tuberculosis, Immunocompetence, Mycobacterium tuberculosis.

INTRODUCTION

Mycobacterium tuberculosis (M. tuberculosis) is a gram-positive, aerobic bacillus transmitted via aerosols between humans, with patients with pulmonary tuberculosis being the main source of contagion[1] due to the presence of bacilli in sputum. The establishment and development of the disease after exposure are directly associated with the host's immune system capacity to control bacterial proliferation.[2,3] Primary infection is mostly asymptomatic and may remain in a latent state for variable periods.[4] It is reported that disease activation occurs in only 5–10% of individuals exposed to the bacterium during their lifetime, whereas the remaining 90–95% immunologically control M. tuberculosis, resulting in a subclinical condition and, in some cases, complete bacterial elimination.[3]

M. tuberculosis primarily affects the lungs but may spread to other organs due to its lymphatic and hematogenous dissemination capability, causing disease in multiple sites such as the central nervous system, genitourinary tract, osteoarticular system, pericardium, and gastrointestinal tract. Tuberculosis is therefore classified into two major

clinical groups: pulmonary tuberculosis (PTB) and extrapulmonary tuberculosis (EPTB), based on their different clinical manifestations.[5,6]

Pulmonary tuberculosis (PTB) is the most common form of the disease[7], generally developing after an individual's first contact with the bacillus.[1] It typically presents with insidious symptoms such as low-grade fever, night sweats, and loss of appetite, which makes early diagnosis challenging.[1] Extrapulmonary tuberculosis (EPTB), on the other hand, is a severe and disseminated form of the disease that can affect multiple organs, including the liver. Its clinical presentation varies depending on the site involved and may include nonspecific symptoms such as fever, weight loss, fatigue, abdominal pain, and asthenia.[7]

It has been observed that factors such as immunosuppression and social conditions, including malnutrition, are associated with the manifestation and severity of extrapulmonary forms[1]. In HIV-negative patients, the most common extrapulmonary manifestation is pleural tuberculosis.[1] Hepatic tuberculosis, however, is a rare form of extrapulmonary tuberculosis, with an atypical and nonspecific presentation, especially when it occurs in isolation.[8]

EPIDEMIOLOGY

This Among visceral abscesses, hepatic abscess is the most frequent, as the liver is particularly susceptible to the formation of purulent collections, whether solitary or multiple. Its annual incidence is estimated at approximately 2.3 cases per 100,000 inhabitants and is more prevalent in men than in women. Despite its relative rarity and nonspecific clinical presentation, it is a condition associated with high morbidity and mortality, reaching around 15% in Western countries.[9,10]

Tuberculous liver abscess, in turn, is an uncommon clinical entity, with approximately 100 cases described in the medical literature. Its incidence, based on hospital records, ranges from 0.029% to 1.47%, whereas autopsy studies report a prevalence between 0.3% and 1.4%.[11,12]

Hepatic and biliary involvement by Mycobacterium tuberculosis occurs most frequently in association with miliary pulmonary tuberculosis, although the gastrointestinal tract may also serve as an entry point for the bacillus. Autopsy studies demonstrate simultaneous involvement of the liver and spleen in 80–100% of extrapulmonary tuberculosis cases. The primary form of hepatic tuberculosis, occurring in the absence of systemic dissemination, accounts for less than 1% of all reported cases.[10,11]

Hepatobiliary tuberculosis shows a male predominance of approximately 2:1. The most common symptoms include abdominal pain, hepatomegaly, jaundice, fever, and chills. Hepatomegaly is the most frequent clinical finding, reported in 94–100% of cases, and the liver may present as nodular on palpation in about 55% of patients, mimicking hepatic neoplasia. Splenomegaly is observed in 25–57% of cases, while jaundice occurs in approximately 35% of patients. Alterations in liver enzymes—elevated aspartate aminotransferase (AST) and alanine aminotransferase (ALT)—are common, described in 91–94% of cases, often associated with hypoalbuminemia and hyperglobulinemia.[9,12]

DIAGNOSIS

The diagnosis of tuberculous liver abscess is based on a combination of imaging methods and specific laboratory tests. Among the most commonly used imaging examinations

are abdominal ultrasound (US) and computed tomography (CT) of the upper abdomen, which allow the detection of suspicious hepatic lesions. However, clinical manifestations are nonspecific—including low-grade fever (37.3°C to 37.8°C), right upper quadrant pain, hepatomegaly, weakness, and night sweats—which frequently hinders early diagnosis.[9,13]

Hepatomegaly is a common finding and is usually associated with elevated alkaline phosphatase, while transaminases often remain within normal limits. Relevant differential diagnoses include ruptured amebic liver abscess and pyogenic abscess secondary to colonic diverticulitis or appendicitis, which may present with similar CT characteristics.[13,14]

Jaundice may occur due to tuberculosis invading the biliary system, leading to ductal obstruction and mimicking hilar neoplasms. Other pathological formations, such as hepatic tuberculomas, may also complicate the differential diagnosis, especially when associated with portal hypertension or hemobilia.[14,15]

Both US and CT have limited specificity for hepatic tuberculosis. Therefore, a triphasic liver CT scan—including arterial, portal venous, and delayed phases—is recommended to improve characterization of space-occupying hepatic lesions.[12] These examinations are essential for determining the location, size, and multiseptated nature of the abscess, in addition to identifying the different evolutionary stages of the disease—from granulomas with or without caseous necrosis to fibrosis and calcification in the scarring phases.[13]

Definitive diagnosis is established by isolating acid-fast bacilli (AFB) in aspirated abscess samples, by the growth of Mycobacterium tuberculosis in culture, or through molecular tests—such as the Rapid Molecular Test for Tuberculosis (RMT-TB)—which demonstrate high sensitivity and specificity.[11,12,14]

TREATMENT

The therapeutic approach to tuberculous liver abscess involves both clinical and surgical measures, depending on the extent of the lesion and the patient's response to drug therapy.[15,16]

Clinical management follows the standardized protocol of the Brazilian Ministry of Health for drug-sensitive tuberculosis, based on the combination of isoniazid (INH), rifampicin (RIF), pyrazinamide (PZA), and ethambutol (EMB), known by the acronym RHZE. The regimen consists of a two-month intensive phase with RHZE, administered as a fixed-dose combination (FDC)—each tablet containing 150 mg of rifampicin, 75 mg of isoniazid, 400 mg of pyrazinamide, and 275 mg of ethambutol—followed by a four-month maintenance phase with the RH regimen (isoniazid and rifampicin). This treatment is recommended for all forms of tuberculosis in patients older than 10 years of age, except in cases of neurotuberculosis.[17,18]

Surgical treatment is indicated in cases where clinical management fails, when there are large purulent collections, or when there is a risk of abscess rupture. The main modalities include open, laparoscopic, or percutaneous drainage, the latter being guided by ultrasound or computed tomography. Intraoperative ultrasound can be particularly useful for the precise localization of abscess cavities, optimizing drainage and reducing the risk of complications.[15,17]

Adequate control of the pyogenic cavity is essential for therapeutic success and for preventing recurrence. Postoperative follow-up should include regular clinical evaluation with monitoring of symptoms such as fever and pain, as well as laboratory assessment

(complete blood count, CRP) and serial imaging—preferably ultrasound—to confirm the complete regression of the lesion.[18,19]

CASE REPORT

A 55-year-old male patient, weighing 70 kg, with a history of type 2 diabetes mellitus (T2DM), hypertension, former smoker (40 pack-years, quit 2 years ago), and former chronic alcohol user (40 years of consumption, quit 2 years ago). Current medications included losartan 50 mg every 12 hours, metformin 850 mg once daily, and glibenclamide 5 mg. He presented to the emergency department with a 7-day history of severe right upper quadrant pain and fever ranging from 39–40°C, with no improvement after the use of simple antipyretics or after 72 hours of empiric antibiotic therapy (azithromycin) prescribed at another facility. He denied nausea, vomiting, diarrhea, and urinary tract symptoms.

On initial medical evaluation, the patient was in regular general condition, febrile, alert, conscious, and hemodynamically stable. Physical examination revealed abdominal tenderness on palpation in the right upper quadrant, with no palpable organomegaly. Medications were administered for pain and fever control, and additional diagnostic tests were requested. Contrast-enhanced CT imaging showed a hypodense lesion with irregular borders in hepatic segment VI, without contrast enhancement, measuring 7.7 × 4.8 × 6.4 cm (estimated volume of approximately 120 mL), associated with a minimal amount of free fluid in the pelvis, and no regional lymphadenopathy. Laboratory results: leukocytosis of 18,890 (neutrophils 83%, lymphocytes 7%), platelets 45,000, hemoglobin 12.20 g/dL, ALT 657.0 U/L, AST 687.0 U/L, alkaline phosphatase 369 U/L, GGT 642 U/L, creatinine 2.5 mg/dL, urea 72 mg/dL, sodium 132.0 mEq/L, lactate 2.3 mmol/L, D-dimer > 4.0, glycated hemoglobin 12.1%. Serologies (HBsAg, VDRL, anti-HIV, anti-HCV) were all negative.

A diagnostic hypothesis of liver abscess was established. Azithromycin was discontinued, and empiric antibiotic therapy with ceftriaxone, metronidazole, and piperacillin/tazobactam (Tazocin) was initiated. In addition, a therapeutic and diagnostic surgical intervention—videolaparoscopic drainage of the abscess—was performed, including hepatotomy with drainage of a moderate amount of purulent material and placement of a drain in the abscess cavity. The purulent material collected during surgery was sent to the laboratory. Analysis isolated Escherichia coli (E. coli) (83,000 CFU), and the Rapid Molecular Test for Tuberculosis (RMT-TB) was positive, demonstrating rifampicin sensitivity.

After the procedure, the patient continued to present with persistent fever, with only subtle laboratory improvement (GGT 507 U/L, alkaline phosphatase 228 U/L, AST 23 U/L, ALT 31 U/L, leukocytosis 10,900 with 81% neutrophils). A contrast-enhanced CT scan was performed for postoperative evaluation following abscess drainage, showing a heterogeneous, amorphous surgical cavity with septations, measuring 13 × 9 × 10 cm (average volume 611 cm^3), containing spontaneously hyperdense foci suggestive of blood content and gas bubbles, with no evidence of abnormal contrast enhancement. The drain was in an appropriate position. A reoperation via laparotomy was then performed for repeat drainage of a septated hepatic abscess, with replacement of the Penrose drain and new collection of material for culture, which resulted positive for Enterococcus faecium (E. faecium).

Following the positive RMT-TB in the hepatic abscess sample, tuberculosis screening was

conducted. The patient had no respiratory symptoms and no epidemiological risk factors. He underwent analysis of two sputum samples for AFB and RMT-TB, both negative. Chest imaging showed no abnormalities. Pulmonary tuberculosis (PTB) was therefore excluded.

Because the abscess sample demonstrated mixed flora, a diagnosis of extrapulmonary tuberculosis (EPTB) presenting as a tuberculous and bacterial hepatic abscess was established. The patient was evaluated by the Infectious Diseases service, which recommended treatment with ceftriaxone plus metronidazole, in addition to the RHZE regimen. The patient remained hospitalized for 21 days for inpatient treatment. After progressive clinical improvement, remaining afebrile for more than 48 hours, and showing improvement in laboratory parameters (Hb 10.5 g/dL, leukocytosis 11,520 with 75% neutrophils and 13% lymphocytes, platelets 369,000, CRP 11.7 mg/L, AST 16 U/L, ALT 20 U/L, total bilirubin 0.83 mg/dL, direct bilirubin 0.43 mg/dL, and indirect bilirubin 0.40 mg/dL), and following multidisciplinary discussion, hospital discharge was proposed. Outpatient treatment with ciprofloxacin and metronidazole for 4–6 weeks was recommended, depending on clinical and laboratory reassessment and monitoring of the hepatic lesion. The standardized Brazilian RHZE regimen was continued. The patient was referred for follow-up in the Infectious Diseases and General Surgery outpatient clinics.

DISCUSSION

The case presented involves a rare pathology with nonspecific clinical features described in the literature but associated with high morbidity and mortality, reaching approximately 15% in Western countries. It is also considered a rare—though not exceptional—form of extrapulmonary tuberculosis. Most reported cases are associated with miliary pulmonary tuberculosis and spread primarily through hematogenous dissemination.[10] Bestow published the first scientific description of tuberculous liver abscess (TLA) in 1858. In one of his randomized studies, he demonstrated that 0.34% of patients with hepatic TB ranged in age from 6 months to 72 years, with a mean age of 39.2 years—an age distribution that closely approximates that of the patient in the present case. Another epidemiological aspect consistent with the literature is the higher prevalence in males, as studies show that among 2.3 cases per 100,000 people, the condition is more frequent in men.[10,20]

Tuberculosis is not commonly encountered in routine clinical practice because M. tuberculosis infections are typically controlled by the host's immune system, meaning that clinical manifestations of TB generally occur in high-risk groups with continuous exposure or in patients with some degree of immunodeficiency.[2,0] In extrapulmonary presentations, this becomes even more epidemiologically evident.[17,19] Therefore, the patient developed an unusual infection in an even rarer anatomical site (the liver), considering that the incidence of hepatic abscesses, based on hospital records, ranges from 0.029% to 1.47%, while autopsy studies report a prevalence between 0.3% and 1.4%.[18,20]

Reviewing the clinical history, the patient did not present clear immunosuppression, given the exclusion of HIV co-infection (negative serologies) and the absence of other comorbidities directly affecting immune function. Nevertheless, he did present an important factor that could justify impaired immunomodulation in controlling tuberculosis: decompensated type 2 diabetes mellitus, with an admission glycated hemoglobin level of 12.1 mg/dL. The immune-modulating impact of hyperglycemia is well established in the literature.[21,22]

Type 2 diabetes mellitus, a chronic disease marked by a slow and progressive increase in inflammatory dysregulation, is associated with elevated levels of pro-inflammatory cytokines (IL-6 and IL-1β), which in turn lead to an increase in macrophage activity. This imbalance results in higher levels of pro-apoptotic factors and heightened inflammatory stimulation.[23] This mechanism may help explain the development of the hepatic abscess, considering that the form presented by this patient accounts for less than 1% of all cases of extrapulmonary tuberculosis (EPTB).[17,19] Thus, it can be inferred that the patient did not have full immunocompetence, which facilitated the unusual presentation of tuberculosis as a hepatic abscess in an HIV-negative individual.

The tuberculous liver abscess, as illustrated in this case, results from microbiological contamination of the hepatic parenchyma, which can occur via the biliary ducts, arterial or portal vessels, or directly. The etiology of pyogenic collections—which may originate from agents such as Mycobacterium tuberculosis, Staphylococcus aureus, protozoa, and helminths—highlights the significant potential for mixed infections, as confirmed in this patient by the presence of both E. coli and M. tuberculosis.[10]

Both ultrasound (US) and computed tomography (CT) are accurate for assessing the location, size, and multiseptated nature of a tuberculous liver abscess. The use of US, in addition to CT, not only as a diagnostic tool but also for follow-up, has been highlighted in many case reports of tuberculous liver abscess (TLA). This preference is mainly justified by its speed, cost-effectiveness, easy accessibility, and the absence of radiation exposure for the patient. Therefore, this method could have been better utilized both for diagnosis and especially for follow-up in the case presented.[24,25]

Although sputum samples in this case tested negative for acid-fast bacilli (AFB), studies indicate that detection is more easily achieved in caseous necrotic tissue; however, its absence should not completely exclude the diagnosis, particularly in regions with high TB incidence[11,15]. In the case evaluated, however, the combination of factors (clinical evaluation and imaging showing no signs of pulmonary involvement), along with negative AFB results, allowed pulmonary TB to be excluded as a diagnostic possibility.

The initial empiric antibiotic therapy with azithromycin was inappropriate, even in the absence of a confirmed diagnosis of TLA, as this macrolide is better suited for bacterial infections of the respiratory tract, skin, soft tissues, ears, oropharynx, and certain sexually transmitted infections, limiting its effectiveness in hepatic infectious conditions such as liver abscesses.[25,26]

Some studies argue that the dense fibrous tissue surrounding abscesses and their substantial size may prevent adequate penetration of antibiotics into the lesion. For this reason, a six-month four-drug antituberculosis regimen (RHZE) is considered the most appropriate therapy and was successfully used in our patient, in conjunction with appropriate antibiotic coverage, resulting in clinical improvement and resolution of the TLA. In addition, because of the mixed bacterial infection, antibiotic therapy with ceftriaxone and metronidazole was appropriately used to target E. coli and E. faecium.[22,26]

CONCLUSION

Tuberculous liver abscess represents an extremely rare manifestation of extrapulmonary tuberculosis and is often difficult to diagnose due to its nonspecific clinical and laboratory

presentation. This case report highlights the importance of clinical suspicion in patients with hepatic abscesses refractory to conventional treatment, particularly in individuals with comorbidities that compromise immune response, such as uncontrolled type 2 diabetes mellitus.

Definitive diagnosis through the Rapid Molecular Test for Tuberculosis (RMT-TB) was essential for guiding appropriate therapy, underscoring the role of molecular methods as indispensable tools in current clinical practice. Combined management—including surgical drainage and targeted antimicrobial therapy, particularly the RHZE regimen—proved effective in resolving the condition and preventing complications.

This case reinforces the need for a multidisciplinary approach and broad etiological investigation in hepatic abscesses of indeterminate origin, including tuberculosis as a differential diagnosis even in the absence of pulmonary involvement. Early identification and appropriate treatment are crucial for achieving favorable outcomes and reducing the morbidity and mortality associated with this rare condition.

REFERENCES

1. Barros ERS, Mello IGKA, Franco CJM, Dodó EA, Lima DGL, Lima MFS. Tuberculose pulmonar e extrapulmonar no contexto clínico e terapêutico. Brazilian Journal of Health Review. 2025 Mar;8(2):e78079–e78079.

2. Li Z, Yang L, Li L, Ye Z, Gong W. Mycobacterium tuberculosis: Immune Response, Biomarkers, and Therapeutic Intervention. MedComm. 2024 Jan;5(1):e419.

3. Orgeur M, Sous C, Madacki J, Brosch R. Evolution and emergence of Mycobacterium tuberculosis. FEMS Microbiol Rev. 2024 Mar 1;48(2):fuae006

4. Rezende TCGD, Vitorino VBS, Borges DS, Castro LFG, Braz RF, Camilo RP, Vieira GA. Tuberculose hepática: relato de caso de um quadro raro e de difícil diagnóstico. Sociedade brasileira de clínica médica. 2024 Nov;22(1):45-50.

5. Lima ACC, Galvão ABZ, Barros GE, Rabello JC, Quintiere BBH, Ferreira IMO, Gonçalves ABM, Napoli AER. Tuberculose Extrapulmonar. Guia Prático Clínica Médica. editora pasteur. 2024 Mar;50: 288–296.

6. Figueiredo AVC, Duarte AO, Vieira MRV, Paranhos SVO, Valadão AF, Magalhães FA. Perfil clínico e epidemiológico dos pacientes com tuberculose extrapulmonar no município de Ipatinga-MG. BJSCR. Jun-ago 2021;35(1):2317–4404.

7. Araújo FGA, Saotome L, Pierini JLG, Ruivo GF. Tuberculose extrapulmonar com envolvimento renal e intestinal: um desafio no diagnóstico precoce. Research, Society and Development. 2023 Dec;12(14): e80121444516-e80121444516.

8. Kumar SV, Senthil N, Rajendran V, Logithasan N, Chenguttuvan A. Extra pulmonary tuberculosis manifesting as liver abscess. Cureus. 2024 Oct;16(10): e70988.

9. Brito AS, Bezerra LC, Cruz IS, Roque HP, Aguiar ABVC, Nogueira MTM, Leite LMBF. Management of hepatic abscesses: an integrative review. Amadeus Int Multidiscip J. 2023;7(13):5-23.

10. Kim JY, Kim SH, Lee JY, Lee YJ, Han JK. A population-based study of pyogenic liver abscess in Korea: incidence, mortality and temporal trends during 2007–2017. J Clin Med. 2021;10(16):3558.

11. Karaosmanoglu AD, Onur MR, Sahani DV, Tabari A, Karcaaltincaba M. Hepatobiliary tuberculosis: imaging findings. AJR Am J Roentgenol. 2016 Oct;207(4).

12. Agarwala R, Dhooria S, Khaire NS, Mishra S, Verma S, Shah J, Mandavdhare HS, Kumari S, Dutta U, Sharma V. Xpert MTB/RIF for diagnosis of tubercular liver abscess. A case series. Infez Med. 2020 Sep 1;28(3):420-424.

13. Yang C, Liu X, Ling W, Song B, Liu F. Primary isolated hepatic tuberculosis mimicking small hepatocellular carcinoma: A case report. Medicine (Baltimore). 2020 Oct 9;99(41):e22580.

14. Lobato PRN, Cruz MFS, Macedo BFS, Quaresma TR, Alves GRM, Teixeira JPAO, Valente MA, Hermes MF, Peres AVS, Santos DW. Hepatic abscess due to tuberculosis in an HIV patient: a case report. Braz J Health Rev. 2020;3(4):7296-7300.

15. Rezende TCGD, Vitorino VBS, Borges DS, Castro LFG, Braz RF, Camilo RP, Vieira GA. Tuberculose hepática: relato de caso de um quadro raro e difícil diagnóstico. Rev Soc Bras Clin Med. 2024;22(1):45-50

16. Ha CW, Shin SD, Goh MJ, Song BG, Kang W, Sinn DH, Gwak GY, Paik YH, Choi MS, Lee JH. Miliary Tuberculosis Initially Presenting as an Isolated Hepatic Abscess. Korean J Gastroenterol. 2025 Jan 25;85(1):78-82.

17. Sharma V, Ahuja V. Hepatic tuberculosis. In: Treatment and Management of Tropical Liver Disease. Elsevier. 2025 Jan;13:104-110.

18. Malewadkar S, Shetty V, Vyas S, Doctor N. Undiagnosed Hepatic Tuberculosis Presenting With Intraabdominal Rupture and Hemoperitoneum, Requiring Urgent Hepatic Resection. J Clin Exp Hepatol. 2021 Jul-Aug;11(4):506-510.

19. Rabahi MF, Silva Júnior JLR, Ferreira ACG, Tannus-Silva DGS, Conde MB. Tratamento da tuberculose. J Bras Pneumol. 2017;43(5):472-486.

20. Lardière-Deguelte S, Ragot E, Amroun K, Piardi T, Dokmak S, Bruno O, Appere F, Sibert A, Hoeffel C, Sommacale D, Kianmanesh R. Hepatic abscess: Diagnosis and management. J Visc Surg. 2015 Sep;152(4):231-43.

21. Mikkelsen RR, Hundahl MP, Torp CK, Rodríguez-Carrio J, Kjolby M, Bruun JM, Kragstrup TW. Immunomodulatory and immunosuppressive therapies in cardiovascular disease and type 2 diabetes mellitus: A bedside-to-bench approach. Eur J Pharmacol. 2022 Jun;15;925:174998.

22. Losie JA, Lam JC, Gregson DB, Parkins MD. Epidemiology and risk factors for pyogenic liver abscess in the Calgary Health Zone revisited: a population-based study. BMC Infect Dis. 2021 Sep 10;21(1):939.

23. Kim JY, Kim SH, Lee JY, Lee YJ, Han JK. A population-based study of pyogenic liver abscess in Korea: incidence, mortality and temporal trends during 2007–2017. J Clin Med. 2021 Nov;10(16):3558.

24. Devi S, Mishra P, Sethy M, Thakur GS. Isolated Tubercular Liver Abscess in a Non-immunodeficient Patient: A Rare Case Report. Cureus. 2019 Dec 3;11(12):e6282.

25. Singh D, Bhatt B, Gupta S, Kumar R. Isolated hepatic tuberculosis: a rare entity in an immunocompetent patient – case report and review of literature. Cureus. 2022;14(3):e22937.

26. Ali N, Ahmad S, Alam S, Ansari J, Naeem M, Shahid M. Primary tuberculous liver abscess: an uncommon presentation in an immunocompetent host. Case Rep Infect Dis. 2022;2022:8945731.

MAILING ADDRESS

AMANDA GARCIA
Rua Dona Julia Prado, 387,C1, Serra Azul, Q10,L07, Jataí/GO - Brazil.
E-mail: dra.amandagarcia@gmail.com

EDITORIAL AND REVIEW

Received: 02/11/25. Accepted: 14/11/25. Published in: 05/12/2025.

SCIENTIFIC JOURNAL
CEREM-GO

DOI 10.37951/2675-5009.2025v6i18.181
ISSN 2675-5009
e25181
SCIENTIFIC ARTICLE - ORIGINAL

COLONOSCOPIC FINDINGS IN A PRIVATE CLINIC IN GOIÂNIA

ISABELLE PINA DE ARAÚJO[1], MICAEL BATISTA RIBEIRO SANTOS[2], ANA LUIZA NAVES PRUDENTE[3], NATÁLIA RIBEIRO SILVÉRIO[3], ISABELA COSTA MONTEIRO[3], AMÉRICO DE OLIVEIRA SILVÉRIO[4,5]

1. Gastroenterology Resident at the Goiânia State General Hospital – HGG, Goiânia/GO, Brazil.
2. Internal Medicine Resident at the Goiânia State General Hospital – HGG, Goiânia/GO, Brazil.
3. Medical Students at the Pontifical Catholic University of Goiás – PUC/GOIÁS, Goiânia/GO, Brazil.
4. Supervisor of the Gastroenterology Medical Residency Program at the Goiânia State General Hospital – HGG, Goiânia/GO, Brazil.
5. Professor at the Faculty of Medicine of PUC-GOIÁS, Goiânia/GO, Brazil.
6. Physician at the Goiânia Digestive System Institute, Goiânia/GO, Brazil.

ABSTRACT

Introduction: Colorectal cancer (CRC) is one of the most prevalent neoplasms worldwide and the second leading cause of cancer-related deaths. Colonoscopy (COL) is an essential examination for diagnosing intestinal diseases and is capable of identifying precancerous lesions, such as adenomatous polyps (AP), at an early stage, allowing their removal before progression to an invasive tumor. Objective: To evaluate the prevalence of AP, CRC, and colonic diverticula (CD) in patients undergoing colonoscopy. **Methodology:** This was a descriptive cross-sectional study in which the findings of COL exams performed between March 2019 and October 2020 in a private clinic were evaluated. Demographic data, colonoscopic findings, whether biopsy and/or polypectomy was performed, and the corresponding histopathological results were collected. A total of 10,951 COL exams were performed during the study period; of these, 719 (6.6%) were excluded for not meeting the inclusion criteria, and the remaining 10,232 (93.4%) composed our sample. **Results:** Among these, 2,354 (23.0%) presented AP, 100 (1.2%) CRC, and 2,984 (29.2%) CD. Age showed a non-normal distribution (Kolmogorov–Smirnov, $p<0.0001$) and was significantly associated with all diagnoses. ROC curve analysis demonstrated good accuracy for age in detecting polyps and tumors. **Conclusion:** This study is justified by the relevance of COL as a CRC screening strategy and by its potential to support improvements in health policies, in addition to providing an understanding of colonoscopic findings that may assist in identifying epidemiological and clinical patterns.

Keywords: Colonoscopy; Adenomatous polyps; Colorectal cancer; Colonic diverticula; Cancer prevention.

INTRODUCTION

Colorectal cancer (CRC) is one of the most prevalent neoplasms worldwide and is responsible for high morbidity and mortality rates. According to the World Health Organization (WHO), it is the third most common cancer in men and the second in women,

and the second leading cause of cancer-related deaths.[1] The growing incidence of CRC—associated with population aging and changes in dietary and lifestyle habits—reinforces the importance of effective prevention strategies.[2]

The disease is characterized by the uncontrolled growth of cells in the colon or rectum, with potential to spread to other organs. Because CRC often develops silently in its early stages, screening plays a crucial role in its early identification.[3]

In this context, colonoscopy (CS) stands out as the main screening and diagnostic method for CRC. This exam uses a flexible endoscope to evaluate the entire colon and rectum after bowel preparation and patient sedation. Although many patients show resistance to undergoing this exam, colonoscopy is considered the gold standard for CRC detection.[4]

Screening is recommended for asymptomatic adults aged 45 or 50 years, depending on local guidelines. In Brazil, the Ministry of Health recommends colonoscopy for CRC screening starting at 50 years of age, at 3- to 5-year intervals, and at earlier ages for individuals with a family history of CRC. Screening should be discontinued in adults over 75 years of age or in those with a limited life expectancy of less than ten years.[5] Current guidelines from the U.S. Preventive Services Task Force argue that beginning screening at age 45 could prevent an additional 2 to 3 CRC cases and 1 CRC death per 1,000 individuals screened when compared to starting at age 50. Diagnostic indications also include symptoms such as hematochezia, unexplained iron-deficiency anemia, changes in bowel habits, and persistent abdominal pain[4].

CS enables the early detection of precancerous lesions, such as adenomatous polyps (AP), allowing for their removal before progression to an invasive tumor.[6] Thus, it serves as an indispensable tool for the immediate treatment of suspicious lesions, significantly reducing CRC-related mortality.[7]

Moreover, colonoscopy is essential for the follow-up of patients with a family history of cancer or with predisposing clinical conditions, such as inflammatory bowel diseases.[4] This context highlights the importance of studies that evaluate colonoscopic findings and their impact on clinical practice.[7] The present study aims to analyze the colonoscopic findings of a population undergoing colonoscopy in a private clinic in Goiânia, with emphasis on the presence of adenomatous polyps (AP), colorectal cancer (CRC), and diverticula.

METHODOLOGY

This was a descriptive cross-sectional study in which the findings of colonoscopy exams performed between March 2019 and October 2020 in a private clinic in Goiânia were evaluated. From the medical records, data were collected regarding patient identification (name, sex, and age), colonoscopic findings, whether biopsy and/or polypectomy was performed, and the corresponding histopathological results.

All patients aged 18 years or older who underwent colonoscopy during the specified period were included. Exams (either colonoscopy or histopathology) that did not present adequate technical quality, as well as patients with medical records that did not allow collection of the necessary data, were excluded.

During the study period, 10,951 colonoscopies were performed; of these, 719 (6.6%) were excluded for not meeting the inclusion criteria. The remaining 10,232 (93.4%)

constituted the study sample.

The study was approved by the Research Ethics Committee of the Pontifical Catholic University of Goiás.

STATISTICAL ANALYSIS

For descriptive statistics, absolute (n) and relative (%) frequencies were calculated for categorical variables, while for the continuous variable (age), the mean, standard deviation, and minimum and maximum values were obtained.

For inferential statistics, chi-square (χ^2) or G-tests were applied according to the stratified distribution, and when necessary, the nonparametric Mann–Whitney test was used for comparing means.

ROC curve analyses were performed to assess the sensitivity and specificity of age in diagnosing adenomatous polyps (AP) and colorectal cancer (CRC).

Statistical calculations were performed using the IBM® SPSS® (Statistical Package for the Social Sciences) software, adopting a significance level of 5% (p-value < 0.05).

RESULTS

The studied population consisted of 10,232 patients, with a mean age of 52.7 ± 14.0 years, and 6,485 (63.4%) were female. The most frequent indications for colonoscopy were cancer prevention (45.6%) and abdominal pain (12.7%). Table 1 presents the distribution of demographic variables and indications in the study population.

Polyps were detected in 3,267 individuals (31.9%), of which 2,354 (72.1%) were adenomatous polyps (AP), while the remaining 913 polyps (27.9%) were hyperplastic or inflammatory. Regarding the degree of dysplasia among AP, 2,087 (88.7%) presented low-grade dysplasia, 124 (5.2%) high-grade dysplasia, and 143 (6.1%) showed no dysplasia. Colorectal cancer (CRC) was diagnosed in 121 patients (1.2%) (Table 2). If high-grade dysplasia is considered carcinoma in situ, then 245 patients (2.4%) presented a tumor.

Table 1. Distribution of demographic variables and indications for colonoscopy

Variable (n = 10,232)	*n*	*f(%)*
Sex		
Female	6485	63.4
Male	3747	36.6
Age (years)		
Up to 39 years old	1932	18.9
40 to 49 years old	2000	19.5
50 years old or older	6300	61.6
Mean (SD)	52.7 (14.0)	
Indication		
Prevention or screening	4663	45.6
Abdominal pain	1297	12.7
Past history of polyps	943	9.2
Enterorrhagia, melena, or hematochezia	787	7.7
Chronic diarrhea	466	4.6
Change in bowel habits	433	4.2
Presence/history of neoplasm	255	2.5
Family history of neoplasm	251	2.5
Constipation	162	1.6
Anemia	141	1.4
Inflammatory bowel disease	137	1.3
Inflammatory bowel disease	131	1.3
Anal disorders	117	1.1
Hemorrhoids/thrombosed hemorrhoids	103	1.0
Hemorrhoids/thrombosed hemorrhoids	81	0.8
History of diverticula	78	0.8
Weight loss	61	0.6
Endometriosis	50	0.5
Preoperative evaluation	32	0.3
Other	25	0.2
Two or more indications	19	0.2

ˣf(%) calculated considering positive cases.

Tabela 2. Distribuição das variáveis incluindo a presença de pólipos, tipos histológico, grau de displasia e o CCR.

Variable (*n*=10.232)	*n*	*f(%)*
Polyp		
Yes	3267	31.9
No	6965	68.1
Histological type of polypsˣ		
Adenomatous	2354	72.1
Hyperplastic or inflammatory	913	27.9
Degree of dysplasia in adenomatous polyps (AP)ˣ		
Low grade	2087	88.7
High grade	124	5.2
No dysplasia	143	6.1
CRC		
Yes	108	1.1
No	10124	98.9

ˣf(%) calculated considering positive cases.

AP = adenomatous polyps; CRC = colorectal cancer..

We performed a ROC curve analysis to evaluate the sensitivity and specificity of diagnosing lesions (adenomatous polyps and colorectal cancer) based on patient age. The results showed a statistically significant curve (Area = 0.658; SE = 0.006; p < 0.0001; 95% CI = 0.646–0.669). Additionally, the sensitivity (S) and specificity (E) of diagnosing lesions (adenomatous polyps and colorectal cancer) at the age threshold of 50 years were assessed (S = 77.1% and E = 47.1%) (Figure 1).

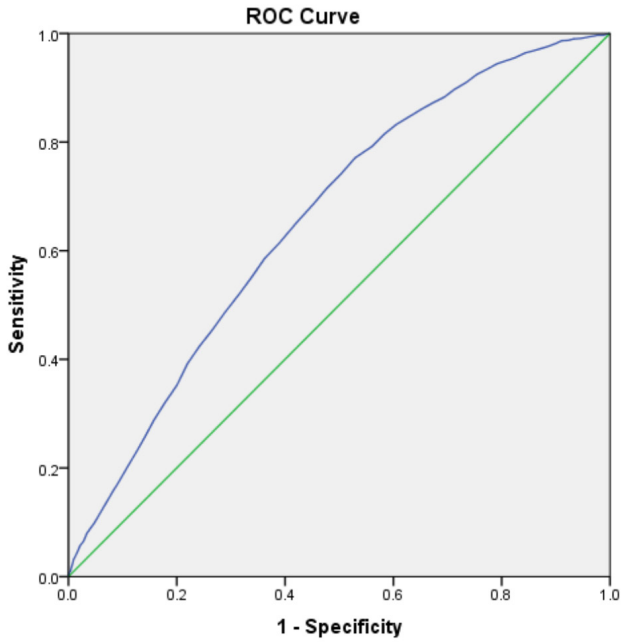

Figure 1. ROC curve for age and the diagnosis of intestinal lesions (adenomatous polyps and colorectal cancer).

Diverticula (CD) were observed in 2,984 patients (29.16%). When we evaluated patient sex, we found the presence of CD in 33.28% (n = 1,247) of men and in 26.78% (n = 1,737) of women (p < 0.00001), with a relative risk (RR) of 1.09 (95% CI: 1.06–1.12), meaning that men have a 1.09-fold higher risk of having CD. The risk difference (RD) was 6.46 (4.64–8.34).

Regarding age, the mean age was significantly higher among patients with CD (62.4 ± 10.5 years) compared with those without CD (48.8 ± 13.3 years) (p < 0.0001). Table 3 compares patients with and without diverticula within the sample, including sex distribution and mean ages.

Table 3. Comparison between patients with and without diverticula regarding age and sex.

DIVERTICULA		TOTAL	WITH	WITHOUT	P-value
N	*η*	10,232	2,984	7,248	
Sex					
Female	*η*	6,485	1,737	4,748	0.0001
	f (%)	63.38%	58.21%	65.51%	
Male	*η*	3,747	1,247	2,500	0.0001
	f (%)	36.62%	41.79%	34.49%	
Age	years	53.5 +/- 14.0	62.4 +/- 10.5	48.8 +/- 13.3	0.0001

To compare the colonic segments affected by diverticula, we initially divided patients into three groups: those with diverticula in the left colon (descending colon, sigmoid, and rectum), those in the right colon (cecum, ascending colon, and transverse colon), and those with diffuse diverticula (involvement of both sides). A much higher prevalence was observed in the left colon, followed by the diffuse pattern and, lastly, the right colon [2,067 (69.27%), 789 (26.44%), and 128 (4.29%), respectively].

When we evaluated the indications for colonoscopy, we found that the vast majority of patients with diverticula underwent the exam for colorectal cancer (CRC) prevention or screening (49.8%), characterizing the diagnosis of diverticula as an incidental finding. Other more frequent indications were abdominal pain (11.63%) and a history of bleeding (5.25%), both of which may be symptoms of diverticular disease or its complications.

DISCUSSION

This study was designed as a cross-sectional observational investigation assessing colonoscopic findings in a total of 10,232 individuals. We observed that most patients were women (63.4%), a fact that may be explained by women's greater interest in their own health, leading them to seek medical services more frequently.[8] Notably, malignant or premalignant lesions were diagnosed in 2,406 (23.5%) cases, with colorectal cancer (CRC) identified in 121 patients (1.2%) and adenomatous polyps (AP) in 2,354 (23.0%). Regarding the degree of dysplasia among AP, 2,087 (88.7%) exhibited low-grade dysplasia, 124 (5.2%) high-grade dysplasia, and 143 (6.1%) showed no dysplasia (Table 2). The presence of diverticula was identified in 2,984 (29.2%) participants, with the majority located in the sigmoid colon (52.1%).

Similar findings were reported in a cross-sectional study conducted in China by Chen and colleagues[9], who performed colonoscopy in 25,593 individuals assessed as high risk for CRC within the Urban China Cancer Screening Program. They diagnosed CRC in 65 patients (0.25%) and polyps

in 3,983 (15.6%), of which 785 (19.7%) were advanced adenomas (including adenomas ≥10 mm or those with villous components or high-grade dysplasia), 2,091 (52.5%) were non-advanced adenomas, and 1,107 (27.8%) were hyperplastic polyps.

Adenomatous polyps and CRC display variable distributions across anatomical segments of the colon. Studies indicate that most AP are located in the distal colon, including the sigmoid and rectum, with percentages ranging from 60% to 75%.[1] The present study aligns with these findings, as 63.6% of polyps were located in this same intestinal segment.

The ROC curve, with an area of 0.658 and $p < 0.0001$, indicated that age is a relevant factor for the accuracy of diagnosing colorectal lesions (CRC and AP), with sensitivity and specificity increasing as patient age advanced. Gupta et al.[4] observed an increased detection of AP with advancing age, from 17.3% before age 40 to 53.8% before age 50. In the present study, we were also able to demonstrate this association through ROC curve analyses evaluating age and the presence of lesions. These results corroborate the literature, which highlights the effectiveness of screening programs in older age groups, when the risk of developing malignant lesions is higher.[10]

In a study conducted at a referral hospital in Tanzania, colonoscopy was performed in 448 patients; among all individuals enrolled, 205 (45.80%) were women and the remaining 243 (54.20%) were men. The mean age in this cross-sectional study was 47 years (ranging from 8 to 90 years). The main indications for the exam included diarrhea (22.54%), abdominal pain (21.21%), hematochezia (18.53%), difficult defecation (16.96%), mucoid stools (10.49%), and anemia (8.70%)[7]. In our study, the most common indications were prevention or screening (45.6%), abdominal pain (12.7%), past history of polyps (9.2%), and enterorrhagia, melena, or hematochezia (7.7%). These findings show that CRC prevention strategies through lesion screening are more firmly established in our setting.

Another study, which also aligns with our findings, evaluated 723 patients with a mean age of 46.03 ± 16.8 years. In this study, 113 patients (15.6%) presented colonic polyps and 11 cases (1.52%) of CRC were detected. Most polyps were located in the left colon (67.5%). There was no statistical difference in the prevalence of AP between the age groups 40–49 years and 50–59 years ($P = 0.77$). Detailed data analysis using ROC curves not only showed that age is a risk factor for the presence of colonic polyps but also suggested cutoff ages of 42.5 years for the presence of all polyp types and 44.5 years for AP.[11]

Diverticula are predominantly distributed in the left colon, especially the sigmoid, which accounts for more than 70% of cases. This distribution is attributed to higher intraluminal pressure in this region during fecal propulsion.[1] In our study, we also observed a higher prevalence of diverticula in the left colon, followed by involvement of both sides and, lastly, the right colon [2,067 (69.27%), 789 (26.44%), and 128 (4.29%), respectively].

CONCLUSION

The results of this study demonstrate the relevance of colonoscopy in screening for conditions such as adenomatous polyps (AP) and colorectal cancer (CRC). AP were diagnosed in 23.0% of patients, and CRC in 1.2%. These findings reinforce the importance of systematic colonoscopic examinations, especially in populations at higher risk for CRC. Therefore, colonoscopy plays a crucial role in the prevention and management of CRC.

However, given its high cost, it is necessary to optimize screening strategies and establish more effective clinical guidelines. In doing so, we can better prioritize healthcare resources and

improve the planning of preventive actions.

REFERENCES

1. Valvano M, Vezzaro V, Fabiani S, Capannolo A, Sgamma E, Cesaro N, Valerii G, Longo S, Barbera C, Lombardi L, Viscido A, Necozione S, Latella G. The connection between diverticulosis and colonic superficial neoplastic lesions in patients who underwent screening colonoscopy. Int J Colorectal Dis. 2023 Apr 21;38(1):107.

2. Bretthauer M, Løberg M, Wieszczy P, Kalager M, Emilsson L, Garborg K, Rupinski M, Dekker E, Spaander M, Bugajski M, Holme Ø, Zauber AG, Pilonis ND, Mroz A, Kuipers EJ, Shi J, Hernán MA, Adami HO, Regula J, Hoff G, Kaminski MF, for the NordICC Study Group. Effect of Colonoscopy Screening on Risks of Colorectal Cancer and Related Death. The New England Journal of Medicine. 2022 Oct;387(17): 1547.

3. Sakr MA, Ebada HE, Abdelkader S, Dabbous HM, Montasser IF, Bassuny AN, Massoud YM, Abdelmoaty AS. Outcome of Colonoscopic Screening in Potential Liver Transplant Candidates. Transplant Proc. 2020 Jan-Feb;52(1):227-232.

4. Gupta S. Screening for colorectal cancer. Hematology/Oncology Clinics of North America. 2022 Jun; 36(3):393-414.

5. Instituto Nacional do Câncer José Alencar Gomes da Silva (INCA). Detecção precoce do câncer. Rio de Janeiro: Ministério da Saúde; 2021. Disponível em: https://www.inca.gov.br/sites/ufu.sti.inca.local/files/media/document/deteccao-precoce-do-cancer.pdf.

6. Wu W, Huang J, Yang Y, Gu K, Luu HN, Tan S, Yang C, Fu J, Bao P, Ying T, Withers M, Mao D, Chen S, Gong Y, Wong MCS, Xu W. Adherence to colonoscopy in cascade screening of colorectal cancer: A systematic review and meta-analysis. J Gastroenterol Hepatol. 2022 Apr;37(4):620-631.

7. Qu LS, Gubi MM. Clinical characteristics of colonoscopy in 448 patients in the Zanzibar Archipelago: a cross-sectional study. Pan Afr Med J. 2022 Apr 18;41:310.

8. Pinheiro RS, Viacava F, Travassos C, Brito AS. Gênero, morbidade, acesso e utilização de serviços de saúde no Brasil. Ciência & Saúde Coletiva. 2022;7(4):687-707.

9. Chen H, Li N, Ren J, Feng X, Lyu Z, Wei L, Li X, Guo L, Zheng Z, Zou S, Zhang Y, Li J, Zhang K, Chen W, Dai M, He J; group of Cancer Screening Program in Urban China (CanSPUC). Participation and yield of a population-based colorectal cancer screening programme in China. Gut. 2019 Aug;68(8):1450-1457.

10. Calderwood AH, Tosteson TD, Walter LC, Hua P, Onega T. Colonoscopy utilization and outcomes in older adults: Data from the New Hampshire Colonoscopy Registry. J Am Geriatr Soc. 2022 Mar;70(3):801-811.

11. Ejtehadi F, Taghavi AR, Ejtehadi F, Shahramian I, Niknam R, Moini M, Tahani M. Prevalence of Colonic Polyps Detected by Colonoscopy in Symptomatic Patients and Comparison Between Different Age Groups. What Age Should be Considered for Investigation? Pol Przegl Chir. 2023 Jul 11;96(1):15-21.

MAILING ADDRESS

AMÉRICO DE OLIVEIRA SILVÉRIO
Rua 34 esquina com a 13, número 157, setor Marista, Goiânia-Goiás- Brazil.
E-mail: americosilverio@hotmail.com

Authors:

Isabelle Pina de Araújo - http://lattes.cnpq.br/1566329079932523 - https://orcid.org/0009-0006-2738-4608

Micael Batista Ribeiro Santos - http://lattes.cnpq.br/3668391543363622 - https://orcid.org/0009-0003-8589-8007

Ana Luiza Naves Prudente - - http://lattes.cnpq.br/6753851899485747 - https://orcid.org/0000-0002-9837-0346

Natália Ribeiro Silvério - http://lattes.cnpq.br/6873333735498690 - https://orcid.org/0000-0002-2654-9697

Isabela Costa Monteiro - http://lattes.cnpq.br/2729038323922039 - https://orcid.org/0000-0003-1747-6243

Américo de Oliveira Silvério - http://lattes.cnpq.br/4684894524696429 - https://orcid.org/0000-0001-7379-5295

Library Review: Izabella Goulart
Spell Check: Dario Alvares
Received: 04/11/25. Accepted: 14/11/25. Published in: 02/12/2025.

SCIENTIFIC JOURNAL
CEREM-GO

DOI 10.37951/2675-5009.2025v6i18.185
ISSN 2675-5009
e26185
SCIENTIFIC ARTICLE - REVISON

FROM ALCOHOLIC LIVER CIRRHOSIS TO HEPATIC STEATOSIS: AN EPIDEMIOLOGICAL PROFILE FROM 2010 TO 2025

LUDYMILLA DE OLIVEIRA PORTILHO LACERDA[1], AMÉRICO DE OLIVEIRA SILVÉRIO[2], STANLEY JAMES FANSTONE PINA[1]

1.Hospital Evangélico de Anápolis, Anápolis/GO, Brazil.
2.Hospital Estadual Geral de Goiânia Dr. Alberto Rassi, Goiânia/GO, Brazil.

ABSTRACT

Introduction: Alcoholic Liver Disease (ALD) represents a progressive spectrum of lesions, starting with steatosis and potentially culminating in hepatic cirrhosis, a pathological scarring process, irreversible in its advanced stages. Excessive alcohol consumption is the largest preventable risk factor worldwide. **Objective:** To analyze the epidemiological profile and hospital morbidity burden of ALD (ICD-10 K70) in Brazil, between January 2010 and September 2025, based on secondary data from the SUS Hospital Information System (SIH/SUS). **Methodology:** Ecological, retrospective, and quantitative study, with data collection on hospitalizations, costs, sex, age group, and mortality for the ICD-10 code K70 (Alcoholic Liver Disease) and, contextually, ICD-10 K74 (Other Liver Diseases). **Results:** A total of 258,300 hospitalizations for ALD (K70) were recorded during the analyzed period. A high prevalence was observed among males and in the productive age group (40 to 69 years), which concentrates 75.82% of cases. The Southeast Region led the absolute number of hospitalizations. The average mortality rate for ALD (K70) between 2007 and 2020 was 17.49%. The nature of care for cirrhosis hospitalizations (K74) was predominantly Emergency (88.1%). **Conclusion:** ALD imposes a high epidemiological and economic burden on the healthcare system, making early screening and the implementation of abstinence policies crucial to prevent the progression of steatosis to irreversible cirrhosis and its complications.

Keywords: Alcoholic liver disease, Alcoholic hepatic cirrhosis, Epidemiology, DATASUS, Steatosis.

INTRODUCTION

ColorectalLiver health is a fundamental pillar of overall well-being, given the multitude of vital functions performed by the liver, including detoxification, protein and enzyme synthesis, metabolism, and regulation of blood components.[1] However, exposure to harmful agents—most notably excessive alcohol consumption—can trigger a series of pathological conditions that severely compromise hepatic function, ultimately culminating in its terminal and irreversible stage, liver cirrhosis.[2]

Alcoholic Liver Disease (ALD) is recognized as a progressive spectrum of hepatic injury. This

spectrum begins with alcoholic hepatic steatosis (AHS), a condition characterized by excessive accumulation of triglycerides within hepatocytes. Although AHS is often asymptomatic and reversible with alcohol abstinence, continued consumption may lead to hepatic inflammation, resulting in alcoholic steatohepatitis.[3,4] Progression of inflammation and cellular injury may subsequently evolve into fibrosis and, ultimately, alcoholic liver cirrhosis (ALC), a condition in which the normal hepatic architecture is replaced by fibrotic tissue and regenerative nodules.[1,2]

Liver cirrhosis, regardless of etiology, represents a major global health problem and is among the leading causes of morbidity and mortality worldwide. The World Health Organization (WHO) reports that alcohol consumption accounts for a substantial proportion of these statistics, with ALD contributing to approximately 5.3% of all global deaths and 5.1% of the global burden of disease.[3,4] In Brazil, harmful alcohol consumption has become one of the most serious public health challenges, constituting a determining factor in more than 10% of the country's total morbidity and mortality.[1]

The transition from alcoholic hepatic steatosis to alcoholic liver cirrhosis is a dynamic and multifactorial process influenced by genetic, environmental, and nutritional factors, viral coinfections (hepatitis B and C), obesity, and the quantity and duration of alcohol consumption.[1,2] Studies indicate that approximately 90% of individuals who abuse alcohol develop alcoholic hepatic steatosis, and among these, a substantial proportion may progress to alcoholic hepatitis (10–35%) and cirrhosis (10–20%).[3,5] This progression represents not only a clinical challenge but also a substantial burden on healthcare systems, with high costs associated with hospitalizations, long-term treatments, and, in advanced cases, liver transplantation.[4,5]

The epidemiological relevance of understanding the profile of liver cirrhosis secondary to alcoholic hepatic steatosis in Brazil is undeniable. Identifying trends in incidence, prevalence, mortality, and associated costs, as well as characterizing the most affected population groups (sex, age, and geographic region), is essential for the development and refinement of public health policies aimed at prevention, early diagnosis, and appropriate disease management.[6] Such information enables targeted public health strategies, optimized resource allocation, and more effective interventions to mitigate the devastating impact of alcoholic liver cirrhosis on the Brazilian population.

In this context, the present study seeks to address gaps in the literature by compiling and analyzing the most recent epidemiological data, focusing on the period from 2010 to 2025. Although data available in the DATASUS system may not explicitly differentiate "alcoholic hepatic steatosis" from "alcoholic liver cirrhosis" in all records, Alcoholic Liver Disease is widely recognized as a continuum encompassing progression from steatosis to cirrhosis.

Thus, the analysis of hospitalization and mortality data related to Alcoholic Liver Disease reflects the impact of this pathological continuum, allowing the construction of an epidemiological profile to inform targeted preventive and public health actions. The overall objective of this study is to analyze the epidemiological profile of liver cirrhosis secondary to alcoholic hepatic steatosis in Brazil, focusing on the period from 2010 to 2025, using secondary data obtained from DATASUS.

METHOD

This study is characterized as a descriptive, ecological, and quantitative investigation

that used secondary data to outline the epidemiological profile of liver cirrhosis secondary to alcoholic hepatic steatosis in Brazil from 2010 to 2025. The ecological approach allows for the analysis of trends and patterns at the population level, while the descriptive and quantitative nature of the study aims to present frequencies, means, and distributions of the variables analyzed.

Data were obtained from the Department of Informatics of the Brazilian Unified Health System (DATASUS), through the Hospital Information System of the Unified Health System (SIH/SUS), as well as from publicly available epidemiological reports. Data retrieval and collection were performed by accessing the Morbidity and Mortality sections of these platforms.

The period of interest for analysis was from 2010 to 2025. Accordingly, the study used the most comprehensive and recent data available within this time frame, explicitly specifying the years covered in each analysis according to data availability.

The following variables related to Alcoholic Liver Disease (ALD), classified under the International Classification of Diseases (ICD-10) code K70.9 (Alcoholic liver disease, unspecified), were collected and analyzed. This code encompasses the disease spectrum, including progression from steatosis to cirrhosis: hospitalizations (absolute number of hospital admissions for ALD), deaths (absolute number of deaths attributed to ALD), public healthcare costs (expenditures related to hospitalizations for ALD), geographic region (North, Northeast, Southeast, South, and Central-West Brazil), sex (male and female), age group (distribution across age categories), and mean length of stay (average duration of hospital admissions).

All available DATASUS data on hospitalizations, deaths, and costs related to ALD (ICD-10: K70.9) across Brazilian regions were included, within the period closest to 2010–2025 according to source availability. Data not directly related to ALD, data that could not be associated with progression from alcoholic steatosis to cirrhosis, or data outside the period of interest without the possibility of extrapolation were excluded.

Collected data were organized and presented in tables to facilitate visualization and interpretation. The analysis was descriptive in nature, focusing on the identification of patterns and trends over time and across different demographic and geographic variables. Bibliographic references were used to contextualize and discuss the epidemiological findings in relation to the pathophysiology and progression of alcoholic hepatic steatosis to cirrhosis.

This study exclusively used publicly accessible secondary data from DATASUS, which are aggregated and anonymized, preventing individual identification. Therefore, in accordance with Brazilian ethical regulations for research involving human subjects, approval by a Research Ethics Committee was waived, as there was no direct intervention involving human participants or collection of identifiable primary data.

RESULTS

The analysis of epidemiological data on Alcoholic Liver Disease (ALD), which encompasses alcoholic hepatic steatosis and its progression to cirrhosis, was conducted based on information available from DATASUS for the period from 2010 to 2022, according to the documents provided. This section presents the findings related to the number of hospitalizations, public healthcare expenditures, mortality rates, and distributions by sex and age group.

Number of hospitalizations for alcoholic liver disease by region (2010–2022)

Table 1. Number of hospitalizations for alcoholic liver disease (ALD) by region (2010–2022)

Year	North	Northeast	Southeast	South	Central-West	Total
2010	617	3,206	8,966	3,468	1,137	17,394
2011	752	3,245	8,742	3,131	1,181	17,051
2012	761	3,784	8,183	3,226	1,084	17,038
2013	705	4,230	7,960	3,276	1,290	17,461
2014	863	3,982	7,658	3,152	1,382	17,037
2015	770	3,949	7,828	3,222	1,498	17,267
2016	771	3,979	7,655	3,121	1,618	17,144
2017	723	3,722	7,150	2,980	1,544	16,119
2018	648	3,667	6,870	2,956	1,467	15,608
2019	595	3,502	6,686	3,013	1,430	15,226
2020	242	1,453	2,951	1,447	667	6,760
2021	650	3,717	6,049	2,740	1,232	14,388
2022	833	4,264	6,979	3,169	1,584	16,829
Total	8,170	43,668	93,823	39,021	16,115	200,302

Source: Lacerda, Silvério, and Pina, 2025.

The data reveal that the Southeast region consistently accounted for the highest volume of hospitalizations throughout the study period. Table 1 shows that, between 2010 and 2022, Brazil recorded a total of 200,302 hospitalizations for ALD. The Southeast region led with 93,823 hospitalizations, representing 46.84% of the national total, followed by the Northeast region with 43,668 hospitalizations (21.8%).

A relative stability in hospitalization rates was observed between 2010 and 2019, with an average of approximately 16,800 hospitalizations per year, followed by a marked decline in 2020 to 6,760 hospitalizations, influenced by the COVID-19 pandemic.[4,6]

Public healthcare expenditures on ald by region (2010–2020)

Table 2. Total Expenditures on Alcoholic Liver Disease (ALD) by Region (2010–2020)

Year	North	Northeast	Southeast	South	Central-west
2010	R$ 455,519.21	R$ 2,906,606.87	R$ 14,722,058.17	R$ 3,871,836.74	R$ 932,092.69
2011	R$ 593,040.12	R$ 2,743,782,90	R$ 14,920,100.98	R$ 3,753,968.82	R$ 961,386.23
2012	R$ 576,863.55	R$ 6,126,743.65	R$ 16,798,522.96	R$ 5,375,006.43	R$ 1,708,636.40
2013	R$ 563,262.07	R$ 8,769,595.23	R$ 18,743,145.56	R$ 6,724,705.89	R$ 4,387,147.44
2014	R$ 708,854.88	R$ 8,634,728.18	R$ 19,118,498.76	R$ 5,522,331.49	R$ 2,981,565.73

2015	R$ 598,429.49	R$ 7,616,793.46	R$ 23,628,286.67	R$ 5,611,110.33	R$ 4,352,445.24
2016	R$ 651,634.50	R$ 8,000,196.46	R$ 21,515,140.18	R$ 8,259,382.69	R$ 6,337,276.25
2017	R$ 821,783.68	R$ 8.210,921.34	R$ 23,724,572.12	R$ 10,893,437.17	R$ 5,636,738.85
2018	R$ 693,997.67	R$ 10,882,165.99	R$ 20,028,424.45	R$ 11,012,198.02	R$ 5,635,023.54
2019	R$ 523,405.58	R$ 9,922,806.35	R$ 14,768,045.29	R$ 9,947,571.52	R$ 3,466,210.16
2020	R$ 164,569.34	R$ 2,527,729.75	R$ 6,251,145.38	R$ 5,424,464.98	R$ 2,554,615.79
Total (2010-2020)	R$ 6,351,330.66	R$ 78,496,613.68	R$ 193,218,919.94	R$ 75,746,034.06	R$ 38,962,112.56
Total	R$ 392,775,010.90				

Source: Lacerda, Silvério, and Pina, 2025.

Between 2010 and 2020, Brazil recorded a total public expenditure of R$ 392,775,010.90 on hospitalizations related to ALD. The Southeast region accounted for the largest share of these expenditures, totaling R$ 193,218,919.94, which corresponds to 49.19% of the national total. The Northeast region followed with expenditures of R$ 78,496,613.68 (19.98%).

Annual expenditures in the Southeast peaked in 2017 (R$ 23,724,572.12), while a significant reduction was observed across all regions in 2020, reflecting the decreased number of hospitalizations in the context of the COVID-19 pandemic.[6]

Mortality rate from alcoholic liver disease by region (2010–2022)

Table 3. Mortality rate for alcoholic liver disease (ALD) by brazilian region (2010–2022)

Year	North	Northeast	Southeast	South	Central-west	Total
2010	13.93	16.90	16.87	15.05	16.51	16.38
2011	13.58	17.02	17.20	15.79	15.85	16.65
2012	16.05	17.50	19.04	16.46	18.99	18.07
2013	15.86	17.69	18.13	17.32	12.83	17.38
2014	17.44	17.14	16.94	15.74	14.56	16.60
2015	15.06	18.94	18.71	16.66	16.54	18.02
2016	17.60	18.49	18.76	18.11	15.40	18.21
2017	18.95	17.74	20.57	16.72	18.06	18.90
2018	19.85	18.24	20.31	17.51	19.79	19.22
2019	18.67	18.52	19.52	18.51	17.25	18.84
2020	22.75	17.07	19.24	16.56	17.03	18.12

2021	20.37	18.63	19.71	17.63	19.01	19.07
2022	19.88	19.10	20.01	18.34	18.87	19.24
Média	17.23	17.92	18.55	16.76	16.97	17.89

Source: Lacerda, Silvério, and Pina, 2025.

Table 3 shows that the national average mortality rate for Alcoholic Liver Disease (ALD) between 2010 and 2022 was 17.89%. The Southeast region presented the highest mean mortality rate (18.55%), followed by the Northeast region (17.92%). The highest single-year mortality rate was observed in the North region in 2020 (22.75%), while the Southeast region exceeded 20% in 2017, 2018, and 2022.[6]

Hospitalizations for ald by sex in Brazil (2017–2022)

Table 4. Hospitalizations for alcoholic liver disease (ALD) by Sex (2017–2022)

Year	Male	Female	Total
2017	985	171	1,156
2018	13,025	2,540	15,565
2019	12,690	2,529	15,219
2020	11,563	2,319	13,882
2021	12,943	2,248	15,191
2022	12,269	2.,650	14,919
Total (2017-2022)	63,475	12,457	75,932

Source: Lacerda, Silvério, and Pina, 2025.

Table 4 demonstrates a clear predominance of hospitalizations for Alcoholic Liver Disease (ALD) among males, totaling 63,475 cases (83.60%) between 2017 and 2022, compared with 12,457 cases (16.40%) among females. A significant increase in hospitalizations was observed between 2017 and 2018, followed by stabilization in subsequent years, with a slight reduction in 2020.[4]

Hospitalizations for ald by age group in Brazil (2017–2022)

Table 5. Hospitalizations for alcoholic liver disease (ALD) by age group (2017-2022)

Age group	2017	2018	2019	2020	2021	2022	Total
10–14 years	1	8	6	3	4	22	44
15-19 years	1	29	28	29	29	22	138
20-29 years	27	399	398	297	299	300	1,720
30-39 years	130	1,665	1,682	1,610	1,694	1,691	8,472
40-49 years	274	3,644	3,559	3,403	3,432	3,565	17,877
50-59 years	366	4,879	4,669	4,359	4,609	4,874	23,756
60-69 years	257	3,429	3,381	2,877	3,158	3,529	16,631
70-79 years	78	1,187	1,225	977	1,090	1,249	5,806

Source: Lacerda, Silvério, and Pina, 2025.

Table 5 shows that the age groups most affected by hospitalizations for ALD were 50–59 years (31.31%), 40–49 years (23.56%), and 60–69 years (21.92%). Together, these age groups accounted for 76.79% of all hospitalizations. The lowest incidence was observed among children and adolescents (10–19 years), reinforcing the chronic and long-term nature of the disease.

Deaths from ald by sex in Brazil (2017–2022)

Table 6. Deaths from alcoholic liver disease (ALD) by sex (2017–2022)

Years	Male	Female	Total
2017	470	171	641
2018	2,575	410	2,985
2019	2,509	467	2,976
2020	2,144	410	2,554
2021	2,435	482	2,917
2022	2,700	410	3,110
Total (2017-2022)	12,833	2,350	15,183
% do Total	84.52%	15.48%	100%

Source: Lacerda, Silvério, and Pina, 2025.

Between 2017 and 2022, Table 6 shows that 12,833 deaths from Alcoholic Liver Disease (ALD) (84.52%) occurred among males, whereas 2,350 deaths (15.48%) were recorded among females. These data demonstrate a marked male predominance in disease-related mortality.[4]

DISCUSSION

The analysis of the epidemiological profile of Alcoholic Liver Disease (ALD) in Brazil, based on DATASUS data covering the period from 2010 to 2022, highlights the complexity and magnitude of this condition as a serious public health problem. ALD represents a

continuous spectrum of liver injury that begins with alcoholic hepatic steatosis and, in many cases, progresses to fibrosis, alcoholic hepatitis, and, in its terminal and irreversible stage, alcoholic liver cirrhosis.[1,2] Understanding this progression is essential for interpreting epidemiological data, as statistics on hospitalizations and deaths attributed to ALD (ICD-10: K70.9) reflect the impact of this pathological continuum, frequently culminating in cirrhosis and its severe complications.[4,6]

Pathophysiology of the progression from alcoholic hepatic steatosis to cirrhosis

The progression from alcoholic hepatic steatosis to alcoholic liver cirrhosis is triggered and driven by ethanol metabolism in the liver. Alcohol (ethanol) is rapidly absorbed; however, most of its catabolism occurs in the liver, primarily through alcohol dehydrogenase (ADH) and cytochrome P-450 2E1 (CYP2E1).[1,7] These metabolic pathways generate toxic byproducts, such as acetaldehyde and reactive oxygen species (ROS). Acetaldehyde is highly reactive and plays a central role in hepatic injury by binding to proteins and DNA, which can disrupt cellular functions, promote protein aggregation (forming Mallory–Denk bodies), and generate neoantigens that trigger immune-mediated self-injury.[1] Reactive oxygen species, in turn, increase oxidative stress, damaging mitochondrial DNA and hepatocytes, thereby perpetuating the cycle of inflammation and fibrosis.[1,7]

Alcoholic hepatic steatosis, the initial stage of Alcoholic Liver Disease, is characterized by excessive fat accumulation within hepatocytes. This accumulation results from an imbalance between fatty acid synthesis and oxidation, as well as increased lipid influx into the liver—processes that are exacerbated by alcohol intake.[1,8] Although alcoholic hepatic steatosis is considered reversible with alcohol abstinence, continued consumption leads to inflammation and hepatocellular death, characterizing alcoholic steatohepatitis.[9]

At this stage, Kupffer cells, the resident hepatic macrophages, respond to endotoxins released by intestinal bacteria—whose absorption is increased by alcohol—by releasing proinflammatory cytokines such as tumor necrosis factor alpha (TNF-α).[7] TNF-α, together with other cytokines, mediates the recruitment of polymorphonuclear cells to the liver, inducing inflammation and cell death, thereby contributing to hepatocellular injury.[1] Chronic inflammation and persistent cellular damage activate hepatic stellate cells, which differentiate into myofibroblasts and produce excessive collagen. This process leads to progressive fibrosis and, ultimately, liver cirrhosis, irreversibly altering hepatic architecture and impairing liver function.[1,2,7]

The irreversibility of liver cirrhosis marks a critical point in the natural history of the disease, characterized by the formation of regenerative nodules that replace normal hepatic tissue and disrupt vascular perfusion.[1] Clinical symptoms, often absent during the early stages of alcoholic hepatic steatosis and compensated cirrhosis, typically become apparent only in advanced disease, manifesting as fatigue, jaundice, ascites, and hepatic encephalopathy.[7] This delayed presentation frequently results in late diagnoses and more severe complications.

Analysis of epidemiological data and its impact on disease burden

Table 1, which presents the number of hospitalizations for Alcoholic Liver Disease (ALD) in Brazil, highlights the Southeast region as bearing the greatest disease burden, with 93,823 hospitalizations between 2010 and 2022. This geographic pattern, consistent with

the literature, reflects not only the higher population density of the region but may also indicate differences in urbanization, alcohol consumption patterns, and access to healthcare services.[6] It is crucial to note the marked decline in hospitalizations in 2020 (6,760 cases), a period strongly influenced by the COVID-19 pandemic. Although alcohol consumption increased significantly worldwide during the pandemic—with potential future repercussions for ALD incidence—the reduction in hospital admissions may reflect healthcare system reorganization, prioritization of COVID-19 cases, and restricted access to treatment for other conditions.[4] The return to pre-pandemic levels in 2021 and 2022 suggests a recovery in healthcare demand or a delayed impact of increased alcohol consumption during the pandemic period.

The economic burden of ALD is further underscored by Table 2, which shows public healthcare expenditures exceeding R$ 392 million between 2010 and 2020, with the Southeast region accounting for nearly 50% of this total. Costs associated with ALD are substantial due to the chronic nature of the disease, recurrent hospitalizations, and the complexity of managing cirrhosis-related complications—such as gastrointestinal bleeding, infections, and liver failure—as well as, in advanced cases, the need for liver transplantation.[2] Alcoholic liver cirrhosis, as the terminal stage of ALD, frequently requires prolonged and costly treatments, placing a significant burden on healthcare budgets.

Mortality rates associated with ALD (Table 3), which include deaths related to cirrhosis, represent a critical indicator of disease impact. The national average mortality rate of 17.89% between 2010 and 2022 underscores the high lethality of ALD, particularly in its advanced stages. The Southeast and Northeast regions exhibited the highest mean mortality rates, while the peak mortality rate of 22.75% observed in the North region in 2020 warrants particular attention.[6] These mortality rates reflect progression from alcoholic hepatic steatosis to decompensated cirrhosis, a condition associated with poor prognosis and high fatality.[7]

Impact of sex and age on the epidemiology of alcoholic liver disease

Sex-based analysis reveals a marked predominance of males in both hospitalizations (83.60% – Table 4) and deaths (84.52% – Table 6) related to Alcoholic Liver Disease (ALD). This finding is consistent with both global and Brazilian literature, which documents significantly higher levels of harmful alcohol consumption among men.[10] Although women exhibit greater susceptibility to the hepatotoxic effects of alcohol—developing ALD more rapidly and at lower cumulative doses due to physiological and metabolic differences—overall prevalence of consumption and total alcohol intake remain higher among men, resulting in a greater absolute number of cases.[1,7,11] Lower healthcare utilization and delayed diagnosis among men may also contribute to the observed disparity in disease-related mortality.[12]

Age-group distribution (Table 5) further corroborates the chronic and long-term nature of ALD. Individuals aged 40 to 69 years accounted for more than 76% of hospitalizations, with a peak incidence in the 50–59-year group (31.31%). This pattern illustrates that ALD—particularly when progressing to alcoholic liver cirrhosis—requires many years of sustained excessive alcohol consumption to manifest clinically at advanced stages. Alcohol misuse, often initiated in early adulthood, typically results in severe hepatic injury and cirrhosis only after decades of chronic exposure.[13] The slow progression of hepatic fibrosis explains the higher incidence of cirrhosis in older age groups. Although rare, cases observed among

children and adolescents are concerning and are generally associated with genetic factors or comorbid conditions, reinforcing the importance of prevention across all age groups.[13]

Progression from alcoholic hepatic steatosis to alcoholic liver cirrhosis leads to a series of severe complications characteristic of decompensated liver disease. Portal hypertension arises as a direct consequence of architectural distortion of the liver and increased vascular resistance, resulting in gastroesophageal varices, ascites, and hepatic encephalopathy. Ascites—defined as pathological accumulation of fluid in the peritoneal cavity—is among the most common complications of cirrhosis and is associated with poor prognosis.[14,15] Hepatic encephalopathy, a neuropsychiatric syndrome, results from the accumulation of neurotoxins that the cirrhotic liver can no longer metabolize. Bacterial infections, particularly spontaneous bacterial peritonitis, are frequent and substantially increase morbidity and mortality.[14]

In addition, hepatocellular carcinoma represents one of the most feared and lethal complications of cirrhosis, with increased incidence among patients with alcoholic liver cirrhosis. Factors such as hepatitis C coinfection and iron overload may further accelerate hepatocarcinogenesis in alcoholic cirrhosis. Early diagnosis and appropriate management of these complications are essential to improve prognosis; however, the most effective intervention remains prevention of disease progression through cessation of alcohol consumption.

Alcohol abstinence is the cornerstone of treatment for ALD at all stages.[7] Alcoholic hepatic steatosis, being reversible, may resolve completely with cessation of alcohol intake. Even in advanced stages such as alcoholic liver cirrhosis, abstinence can stabilize disease progression, reduce the risk of complications, and improve survival.[7] Adherence to abstinence, however, represents a major challenge and requires multidisciplinary approaches that integrate medical care with behavioral and psychosocial interventions, including rehabilitation programs and support groups.[7,11] Screening tools such as the Alcohol Use Disorders Identification Test (AUDIT) are valuable in primary care settings for early detection of harmful alcohol use, enabling timely intervention before irreversible liver damage occurs.[11,12]

Early diagnosis of alcoholic hepatic steatosis and ALD in general is further hindered by the asymptomatic nature of the disease in its initial stages and by the social stigma associated with alcoholism, which often leads patients to underestimate or deny alcohol consumption.[10] This frequently results in delayed diagnoses, often when cirrhosis is already established and decompensated. Underreporting within health information systems—stemming from difficulty in obtaining accurate alcohol consumption histories—also contributes to underestimation of the true magnitude of the problem.

Public health policies must therefore prioritize primary prevention of harmful alcohol use, population education regarding the risks of alcoholic hepatic steatosis and its progression to cirrhosis, and strengthening of screening and early diagnostic strategies for ALD. This includes awareness campaigns, improved access to mental health services and addiction treatment, and integration of preventive strategies within primary healthcare. Identification of vulnerable populations - particularly men of working age—allows for more targeted and effective interventions.

The findings demonstrate a high burden of hospitalizations and deaths attributable to ALD, with the Southeast region and male sex disproportionately affected. Individuals aged 40 to 69 years account for the majority of cases, highlighting the chronic nature of

the disease and the prolonged exposure required for progression to advanced stages such as cirrhosis. Public expenditures related to ALD are substantial, reflecting the complexity and cost of managing decompensated liver disease, with direct implications for the Brazilian Unified Health System. The pathophysiology of ALD, driven by the toxic metabolism of ethanol, is well established and underscores a continuum in which reversible alcoholic hepatic steatosis may progress to irreversible alcoholic liver cirrhosis with fatal complications. Alcohol abstinence - the cornerstone of both treatment and prevention - is essential to reverse steatosis and mitigate fibrosis progression, even in cirrhotic stages.

In conclusion, Alcoholic Liver Disease in Brazil, encompassing progression from alcoholic hepatic steatosis to cirrhosis, remains a major public health challenge. Epidemiological data from DATASUS, despite inherent limitations, provide a robust foundation for understanding disease burden and underscore the urgent need for coordinated public health actions to mitigate its impact and improve quality of life among affected individuals. The contrast between the reversibility of alcoholic hepatic steatosis and the irreversibility of alcoholic liver cirrhosis emphasizes the critical importance of early intervention and lifestyle modification through alcohol abstinence.

CONCLUSION

The analysis of the epidemiological profile of Alcoholic Liver Disease (ALD) in Brazil, with emphasis on the progression from alcoholic hepatic steatosis to alcoholic liver cirrhosis, based on DATASUS data from 2010 to 2022, reinforces the substantial burden this condition imposes on national public health. ALD, encompassing the spectrum from steatosis to cirrhosis, is a chronic and progressive disease with a high potential for morbidity and mortality, whose clinical and socioeconomic consequences are considerable. It can therefore be concluded that ALD—particularly alcoholic liver cirrhosis arising from alcoholic hepatic steatosis—represents a multifaceted challenge that requires an integrated public health approach. Strengthening primary prevention strategies aimed at reducing harmful alcohol consumption, as well as improving screening and early diagnosis of alcoholic hepatic steatosis, especially among high-risk populations, is essential.

REFERENCES

1. Moya LC. Espectro da doença Hepática alcoólica: uma revisão acerca da fisiopatologia e repercussões clínicas. Braz J Health Rev 2022 May;5(4):13904–27.

2. Fonseca GSGB, Noleto RS, Araujo VC, Breitenbach LM, Milhomem BM, Capistranio YM, Ferreira LJCR, Frazao JCM, Freitas Júnior LF, Rodrigues DAS, Leite MA, Silva VMS, Leal HS, Sobrinho ACX, Ferreira CVN, Alves DA, Oliveira Filho GS, Silva SRL, Costa FT, Silveira LMM, Alcântara ALF. Cirrose hepática e suas principais etiologias: Revisão da literatura. E-Acadêmica 2022;3(2):e8332249.

3. Aslam A, Kwo PY. Epidemiology and disease burden of alcohol associated liver disease. J Clin Exp Hepatol 2023 Jan-Feb; 13(1):88–102.
4. Costa LSG, Sousa AM, Araújo BLPC, Fonseca VCR, Barros BC, Lima CAN, Recco GC, Guedes QVC, Carneiro RBS, Silvestre MÊS, Zanoni RD, Silva MFTS. A análise epidemiológica da doença hepática alcoólica no Brasil entre os anos de 2017 e 2022. Braz J Implantol Health Sci 2024 Jan;6(1):67–80.

5. Meneguetti BB, Rocha AS, Vasconcelos DF, Magalhães GS, Nogueira JRC, Neves JM. Doença hepática alcoólica no Brasil, uma visão epidemiológica. Cad Med UNIFESO 2018 Apr;1(1).

6. Pedrosa MSP, Bragança LL, Menezes LC, Guimarães RM, Souza FHS, Oliveira MER, Sampaio NVP, Gonçalves KC, Costa LJB, Santos JRB Jr, Alves GF, Zizemer VS, Araujo TFC, Lobato BR, Pereira RPL, Catarina TPC, Araújo FAV Jr, Viégas JVO, Barboza KRM, Costa GC, Fracaro AC, Lima DKH, Formigheri HL, Farinha VR, Fernandes CHF, Magalhães KA, Moreira SFB, Maranhão MM, Maia ALRB, Assis JJC, Ferreira CC, Batistello MEQ, Santos DC, Pegoraro CN, Sousa KMM, Silva LWB, Duvale AG, Morera CS, Oliveira MM, Almeida ELM, Santos LDMF, Santos TEF, Torres RC, Silva DP, Pereira ID.. Os principais tipos e manifestações da Cirrose Hepática: uma atualização clínica. Rev Bras Rev Saude 2023 Jan-Feb; 6(1):4423–39.

7. U.S. Department of Health and Human Services. Doença hepática alcoólica. In: Manuais MSD Edição para Profissionais; 2025 May.

8. Souza ACM, Oliveira JK, Santos LCP. Perfil epidemiológico de pacientes com cirrose hepática atendidos ambulatorialmente em hospital de referência do oeste do Paraná. Fag J Health 2021 Mar; 3(1):59-64.

9. Kumar V, Abbas AK, Fausto N, Aster JC. Robbins e Cotran: Bases Patológicas das Doenças. 8. ed. Rio de Janeiro: Elsevier; 2010.

10. Rocha EG, Pereira MLD. Representações sociais sobre cirrose hepática alcoólica elaboradas por seus portadores. Rev Bras Enferm 2007 Dec;60(3):344-52.

11. Melo APS, França EB, Malta DC, Garcia LP, Mooney M, Naghavi. Mortalidade por cirrose, câncer hepático e transtornos devido ao uso de álcool: Carga Global de Doenças no Brasil, 1990 e 2015. Rev Bras Epidemiol 2017 May;20:61–74.

12. Soler GLN, Silva AWSM, Silva VCG, Teixeira RJ. Prevalência de esteatose hepática e consumo de álcool em participantes do Projeto Atividade Física na Vila. Rev Assoc Med Bras 2011 Feb;57(3):320-325.

13. Brasil. Ministério da Saúde. Departamento de Informática do Sistema Único de Saúde (DATASUS). Sistema de Informações Hospitalares do SUS (SIH/SUS). Período jan 2010–set 2025 [base de dados]. Brasília: Ministério da Saúde; 2025.

14. Organização Mundial da Saúde. Global status report on alcohol and health. Geneva: World Health Organization; 2014.

15. Javaid N, Khan Z, Ali MA, Tahir SK. EVALUATING THE IMPACT OF EARLY NUTRITIONAL ASSESSMENT AND INTERVENTION IN HOSPITALIZED LIVER CIRRHOSIS PATIENTS. Arq Gastroenterol. 2022 Jan-Mar;59(1):22-28.

MAILING ADDRESS

LUDYMILLA OLIVEIRA PORTILHO LACERDA
Rua T-44, Setor Bueno, 1017, Edifício Tropical Plaza, apartamento 1203, Goiânia, Goiás.
E-mail: ludymillalacerda12@gmail.com

EDITORIAL AND REVIEW

Received: 14/12/2025. Accepted: 22/01/26. Published in: 19/02/2026.

SCIENTIFIC JOURNAL
CEREM-GO

DOI 10.37951/2675-5009.2025v6i18.188
ISSN 2675-5009
e26188
SCIENTIFIC ARTICLE - CASE REPORT

SURGICAL DRAINAGE OF A CUTANEOUS ABSCESS IN PATIENT WITH MULTIPLE SCLEROSIS AND EHRLES-DANLOS SYNDROME: A CASE REPORT

THAIS LIMA DOURADO[1], GUSTAVO SIQUEIRA ELMIRO[1], BRUNO ALVES RODRIGUES[1], GIULLIANO GARDENGHI[1,2,3]

1. Clínica de Anestesia de Goiânia (CLIANEST) – Goiânia/GO
2. Hospital ENCORE– Aparecida de Goiânia/GO
3. Instituto de Neurologia de Goiânia – Goiânia/GO

ABSTRACT

Introduction: Multiple sclerosis (MS) and Ehlers-Danlos syndrome (EDS) pose specific challenges to anesthetic management, particularly in the setting of active infection and polypharmacy. Careful selection of anesthetic technique is essential to minimize hemodynamic instability, neurological worsening, and tissue injury. **Case report:** A 38-year-old woman with MS, EDS and hypothyroidism, on beta-interferon, levothyroxine, escitalopram, zolpidem and daptomycin, was scheduled for surgical drainage of a cutaneous abscess in the lower limb. General anesthesia was induced with propofol and fentanyl and maintained with sevoflurane under spontaneous ventilation through a laryngeal mask airway. Ultrasound-guided femoral nerve block and lateral femoral cutaneous nerve block were performed using 0.5% ropivacaine to provide regional analgesia. Intraoperative monitoring showed stable hemodynamics, adequate oxygenation and ventilation, without adverse events. No new neurological deficits or block-related complications were observed in the immediate postoperative period. **Conclusion:** Low-dose balanced general anesthesia with laryngeal mask airway, spontaneous ventilation and ultrasound-guided peripheral nerve blocks proved to be a safe and effective strategy for abscess drainage in a patient with MS and EDS, and may be considered a prudent alternative to neuraxial anesthesia in similar complex scenarios.

Keywords: Multiple sclerosis, Ehlers-Danlos syndrome, General anesthesia, Peripheral nerve block, Abscess; Case report.

INTRODUCTION

Multiple sclerosis (MS) is a chronic inflammatory demyelinating disease of the central nervous system, with the potential for relapses triggered by infection, hyperthermia, surgical stress, metabolic disturbances, and significant hemodynamic variations.[1,2] Both general and regional anesthesia techniques may be used in patients with MS, provided that normothermia, cardiovascular stability, and adequate neurological monitoring are maintained.[1,2]

Ehlers–Danlos syndrome (EDS) comprises a group of hereditary connective tissue disorders

characterized by joint hypermobility, cutaneous and vascular fragility, a predisposition to bruising, and potential difficulties with vascular access, airway management, and needle punctures.[3,4] Atraumatic handling, careful patient positioning, and heightened awareness of hemorrhagic risk and tissue-related complications are recommended.[3,4]

The coexistence of MS, EDS, hypothyroidism, and the use of immunomodulatory agents, psychotropic medications, and antimicrobials increases the complexity of anesthetic planning, particularly in the presence of an active infectious focus. This case report describes the anesthetic management of a patient with MS and EDS, along with multiple comorbidities, undergoing drainage of a lower limb abscess, emphasizing the use of balanced general anesthesia combined with ultrasound-guided peripheral nerve blocks as a safe alternative to neuraxial anesthesia.

CASE REPORT

A 38-year-old female patient with a history of multiple sclerosis, Ehlers–Danlos syndrome, and hypothyroidism, under regular outpatient follow-up, classified as ASA physical status II. She was receiving levothyroxine, escitalopram, zolpidem, and regular beta-interferon therapy for multiple sclerosis. In the context of a soft tissue infection, she was also being treated with daptomycin as prescribed by the infectious disease team.

She was admitted to the hospital presenting with severe pain, hyperemia, local warmth, erythema, and areas of fluctuation in the lower limb. A diagnosis of a cutaneous abscess of the lower limb was established, with an indication for surgical drainage on a relative urgent basis.

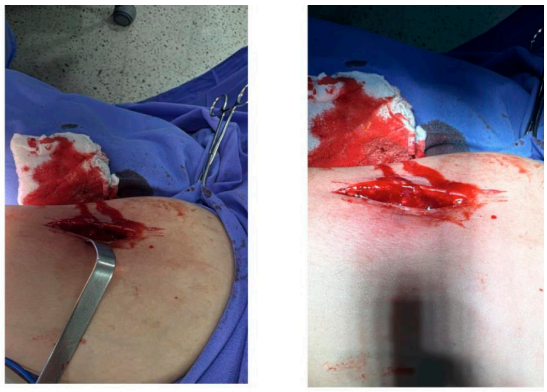

Figure 1. Intraoperative aspects of cutaneous abscess drainage in the lower limb. (A) Initial incision revealing a purulent collection and infiltrated margins of the subcutaneous tissue. (B) Enlargement of the incision with full exposure of the cavity and removal of purulent content, allowing adequate drainage and debridement.

On preanesthetic evaluation, the patient was in good general condition, afebrile, conscious and oriented, with no new neurological deficits compared with baseline. Cardiopulmonary examination revealed no significant abnormalities. Laboratory tests were within acceptable limits for the procedure (final medical records were not available for comparison to assess possible changes). There was no history of previous anesthetic complications.

The following critical considerations were identified: risk of MS exacerbation, tissue and vascular fragility associated with Ehlers–Danlos syndrome, the need for an atraumatic technique, maintenance of normothermia, and assessment of potential drug interactions. Neuraxial anesthetic techniques were not employed due to the presence of a demyelinating disease, a connective tissue disorder, and the availability of a safe alternative using peripheral nerve blocks.

Anesthetic technique

In the operating room, standard monitoring was established, including continuous electrocardiography, noninvasive blood pressure, pulse oximetry, and capnography.

Balanced general anesthesia was performed with intravenous induction using propofol 100 mg and fentanyl 60 mcg, followed by insertion of an appropriately sized laryngeal mask airway. Spontaneous ventilation was maintained with oxygen and sevoflurane at concentrations titrated to the anesthetic depth.

As an analgesic adjunct, an ultrasound-guided femoral nerve block and an ultrasound-guided lateral femoral cutaneous nerve block were performed, using 0.5% ropivacaine in a volume appropriate to cover the surgical field, avoiding needle insertion in areas with signs of inflammation.

Intraoperative course

The surgical procedure was completed without complications (Figure 1). Multiparametric monitoring records demonstrated stable vital signs throughout the procedure, with heart rate ranging from 74 to 97 bpm in sinus rhythm; oxygen saturation between 95% and 100%; capnography showing regular waveforms with end-tidal carbon dioxide values between 38 and 49 mmHg; and noninvasive blood pressure ranging approximately from 98/61 mmHg to 126/99 mmHg (Figure 2).

Figure 2. Images from the multiparameter monitor demonstrating stable hemodynamic and ventilatory parameters throughout the procedure. Panels 2A and 2B correspond to the initial phase of anesthesia, whereas panels 2C and 2D represent the period after tracheal extubation, with continued stability of vital signs. No vasopressor support was required, and there were no episodes of desaturation, arrhythmias, or ventilatory difficulty.

No vasopressor support was required, and there were no episodes of desaturation, bronchospasm, arrhythmias, or ventilatory difficulty with the laryngeal mask airway. The abscess drainage procedure was completed without complications.

At the end of the procedure, sevoflurane was gradually reduced while maintaining adequate spontaneous ventilation. The laryngeal mask airway was removed at a safe superficial anesthetic plane, with the patient awake, cooperative, hemodynamically stable, and with satisfactory analgesia. In the post-anesthesia care unit, she reported no new neurological complaints and showed no signs of complications related to the peripheral nerve blocks or the airway. The patient remained hospitalized for continued clinical follow-up and infection control.

DISCUSSION

This case highlights the challenges and strategies involved in the anesthetic management of a patient with multiple sclerosis and Ehlers–Danlos syndrome in the context of an active infection. In multiple sclerosis, factors such as infection, hyperthermia, and hemodynamic instability may precipitate transient worsening or disease relapses, thus requiring careful anesthetic planning.[1] The literature reports the safe use of both general and regional anesthesia, emphasizing the importance of individualized management, strict maintenance of normothermia, and perioperative neurological vigilance.[1] In the present report, the choice of low-dose general anesthesia with sevoflurane, spontaneous ventilation, and continuous monitoring adhered to these principles and allowed adequate anesthetic control with minimal neurological interference.

In Ehlers–Danlos syndrome, tissue and vascular fragility demand heightened attention to patient positioning, needle punctures, and airway management.[3,4] The use of a laryngeal mask airway, inserted with a gentle technique, may reduce the risk of mucosal and cervical structure trauma when compared with orotracheal intubation in selected patients. Additionally, the use of ultrasound-guided peripheral nerve blocks enhances precision, reduces the number of needle punctures, and allows lower volumes of local anesthetic, thereby increasing safety, particularly in scenarios where infected areas must be avoided.[3,4]

Furthermore, the association of peripheral nerve blocks with general anesthesia proved advantageous by providing effective analgesia, reducing the need for systemic opioids, and attenuating the surgical stress response, aspects that are particularly relevant in patients with multiple sclerosis. This approach may contribute to greater autonomic stability and a lower risk of perioperative neurological exacerbations, as suggested by clinical series and previous case reports.[5,6] The observed hemodynamic stability, absence of respiratory events, adequate spontaneous ventilation, and lack of immediate neurological deterioration further support the feasibility of the chosen strategy.[5,6]

The decision not to perform neuraxial anesthesia was based on the combination of present risk factors, including a demyelinating disease, a connective tissue disorder, and the availability of an effective and less invasive analgesic alternative. This approach aligns with a prudent strategy frequently recommended in complex situations in which the cumulative potential risks may outweigh the benefits of central neuraxial blockade.[5,6] The absence of hemodynamic instability, respiratory events, or immediate postoperative neurological worsening reinforces

the feasibility and safety of the adopted anesthetic strategy.[5,6]

CONCLUSION

The combination of low-dose balanced general anesthesia using a laryngeal mask airway, maintenance of spontaneous ventilation, and ultrasound-guided peripheral nerve blocks with 0.5% ropivacaine proved to be a safe and effective strategy for lower limb abscess drainage in a patient with multiple sclerosis, Ehlers–Danlos syndrome, and hypothyroidism. This case reinforces the importance of individualized anesthetic techniques, careful selection of analgesic methods, and rigorous monitoring in the management of patients with multiple rare comorbidities.

REFERENCES

1. Gropper MA, Eriksson LI, Fleisher LA, Wiener-Kronish JP, Cohen NH, Leslie K, editors. Miller's anesthesia. 9th ed. Philadelphia: Elsevier; 2019.

2. Barash PG, Cullen BF, Stoelting RK, Stock MC, Ortega R. Barash, Cullen, and Stoelting's Clinical Anesthesia. 9th ed. Philadelphia: Lippincott Williams & Wilkins (LWW); 2023.

3.Wiesmann T, Castori M, Malfait F, Wulf H. Recommendations for anesthesia and perioperative management in patients with Ehlers-Danlos syndrome(s). Orphanet J Rare Dis. 2014 Jul 23;9:109.

4. Orphanet. Ehlers-Danlos syndrome: anesthetic considerations [Internet]. [citado 10 nov 2025]. Disponível em: https://www.orpha.net.

5. Dubuisson N, de Maere d'Aertrijcke O, Marta M, Gnanapavan S, Turner B, Baker D, Schmierer K, Giovannoni G, Verma V, Docquier MA. Anaesthetic management of people with multiple sclerosis. Mult Scler Relat Disord. 2023 Dec;80:105045.

6. Ohshita N, Gamoh S, Kanazumi M, Nakajima M, Momota Y, Tsutsumi YM. Anesthetic Management of a Patient With Multiple Sclerosis. Anesth Prog. 2017 Summer;64(2):97-101.

MAILING ADDRESS

GIULLIANO GARDENGHI
CET – CLIANEST, AV. T-32, 279 - Setor Bueno, Goiânia - GO, Brasil.
E-MAIL: coordenacao.cientifica@ceafi.edu.br

EDITORIAL AND REVIEW

Chief editors:

Waldemar Naves do Amaral - http://lattes.cnpq.br/4092560599116579 - https://orcid.org/0000-0002-0824-1138
Tárik Kassem Saidah - http://lattes.cnpq.br/7930409410650712- https://orcid.org/0000-0003-3267-9866

Authors:

Thais Lima Dourado - http://lattes.cnpq.br/0747280828692715 - https://orcid.org/0009-0007-7017-5235

Gustavo Siqueira Elmiro - http://lattes.cnpq.br/4765163399934337- https://orcid.org/0000-0003-2113-8757

Bruno Alves Rodrigues - http://lattes.cnpq.br/9742678649923053 - https://orcid.org/0000-0001-8433-9869

Giulliano Gardenghi - http://lattes.cnpq.br/1292197954351954 - https://orcid.org/0000-0002-8763-561X

Library Review: Izabella Goulart
Spell Check: Dario Alvares
Received: 21/01/26. Accepted: 26/01/26. Published in: 30/01/2026.

SCIENTIFIC JOURNAL
CEREM-GO

DOI 10.37951/2675-5009.2025v6i18.189
ISSN 2675-5009
e26189
SCIENTIFIC ARTICLE - REVISION

DESCRIPTION OF CLINICAL CHARACTERISTICS, DIAGNOSTIC CRITERIA AND MANAGEMENT OF INFECTIOUS ENDOCARDITIS IN A TERTIARY HOSPITAL IN GOIÁS: AN 11-MONTH RETROSPECTIVE STUDY

GABRIELLA TORRANO CARVALHO PIMENTEL[1], LUCIANA FERNANDES BALESTRA[1,2], GIULLIANO GARDENGHI[3,4]

1. Hospital de Urgências de Goiás Dr. Valdemiro Cruz – Goiânia/GO, Brasil.
2. Hospital do Coração Anis Rassi – Goiânia/GO, Brasil.
3. Centro de Ensino e Treinamento da Clínica de Anestesia – Goiânia/GO, Brasil.
4. Hospital ENCORE – Aparecida de Goiânia/GO, Brasil.

ABSTRACT

Introduction: Infective endocarditis (IE) is a severe condition characterized by infection of the inner layer of the heart, particularly the heart valves, by microorganisms such as bacteria or fungi. It is essential to highlight the importance of preventing infective endocarditis, especially in at-risk patients. Objective: To analyze risk factors, diagnosis, and therapeutic approaches adopted in patients with IE admitted to a tertiary hospital in Goiás over a 11-month period. Methods: This was an observational, retrospective, and descriptive study conducted at a tertiary hospital in Goiás, reviewing medical records of patients hospitalized with infective endocarditis between May 2024 and March 2025, diagnosed according to the Modified Duke Criteria. Clinical, laboratory, electrocardiographic, radiographic, and echocardiographic data were analyzed, including vegetation characteristics and associated complications. Times to diagnosis, length of hospital stay, and, when applicable, surgery were recorded, as well as antimicrobial regimens and cardiac surgical interventions. Outcomes included hospital discharge, outpatient follow-up, or death, ensuring patient anonymity and adherence to ethical standards. Results: Among the nine patients evaluated with infective endocarditis, eight required the use of a central venous catheter during hospitalization. Transthoracic echocardiography identified vegetations in six cases, while transesophageal echocardiography was necessary in three. Most patients (7/9) were discharged, with two deaths recorded. Six presented positive blood cultures, predominantly caused by multidrug-resistant microorganisms, while three remained negative. Seven patients had vegetations larger than 10 mm, associated with higher risk of complications, and three fulfilled definitive Duke criteria. Conclusion: The study analyzed nine cases of infective endocarditis, highlighting the importance of the modified Duke criteria and complementary tests, such as echocardiography and blood cultures, for diagnostic confirmation. Prolonged antimicrobial therapy, guided by susceptibility testing, resulted in favorable clinical

outcomes in most patients, although limited access to cardiac surgery delayed the correction of severe lesions in some cases. Early detection, a multidisciplinary approach, and prompt outpatient follow-up proved essential to reducing complications and recurrences.

Keywords: Endocarditis Bacterial, Risk factors, Diagnosis, Treatment, Therapeutics, Echocardiography, Cardiovascular infections.

INTRODUCTION

Infective endocarditis (IE) is a severe condition characterized by infection of the inner lining of the heart, particularly the cardiac valves, caused by microorganisms such as bacteria or fungi. The disease develops through the colonization of damaged endothelial surfaces, where pathogens adhere and form vegetations composed of platelets, fibrin, inflammatory cells, and microbial colonies. IE may affect individuals with native valves as well as those with prosthetic valves, presenting distinct clinical features depending on the valve involved or the presence of intracardiac devices.[1]

The diagnosis of IE is challenging and requires the integration of clinical, laboratory, and imaging findings. The primary diagnostic tool is the modified Duke criteria[1], which are based on major criteria (such as positive blood cultures and evidence of endocardial involvement on echocardiography) and minor criteria (including fever, predisposing factors, and vascular phenomena). Transthoracic or transesophageal echocardiography is an essential modality for detecting vegetations, abscesses, or prosthetic valve dehiscence, and plays a crucial role in diagnostic confirmation.[2]

Risk factors for the development of IE include the presence of prosthetic heart valves, congenital heart disease, a history of prior endocarditis, use of intracardiac devices, hemodialysis, and intravenous drug use. Immunosuppressed patients or those with comorbidities such as cancer are also at increased risk. In addition, dental procedures in patients with pre-existing valvular disease may act as precipitating factors due to procedure-induced transient bacteremia.[3]

The therapeutic management of IE is complex and should be conducted by a multidisciplinary team. Empirical antibiotic therapy should be initiated promptly after blood cultures are obtained, with subsequent adjustment according to the identified etiologic agent and its antimicrobial susceptibility profile. Treatment duration typically ranges from four to six weeks, with the intravenous route preferred in most cases. Surgical intervention is indicated in situations such as heart failure, failure of medical therapy, infections caused by resistant microorganisms, or complications including embolic events and cardiac abscesses.[4]

Finally, the importance of IE prevention must be emphasized, particularly in high-risk patients. Antibiotic prophylaxis for dental procedures is recommended for selected high-risk groups in accordance with international guidelines. Careful follow-up, treatment adherence, infection control, and patient education regarding early signs and symptoms are essential measures to reduce the morbidity and mortality associated with IE.[5,6]

Therefore, the primary objective of this study was to describe the clinical characteristics, diagnostic criteria, and therapeutic management of patients with infective endocarditis admitted to a tertiary hospital in Goiás over an 11-month period. The specific objectives were to: identify the main clinical characteristics of patients diagnosed with IE; describe

the diagnostic methods used (laboratory tests, imaging studies, and clinical criteria); and evaluate the therapeutic approaches employed (antibiotic therapy, surgery, and clinical support) and their outcomes.

METHODS

Patients admitted to the Hospital de Urgências do Estado de Goiás (HUGO) between May 2024 and March 2025 (11 months) with a diagnosis of infective endocarditis (IE) were evaluated. This was an observational, retrospective, and descriptive study, conducted at a tertiary referral hospital in the state of Goiás, with data collected through medical record review of patients diagnosed with infective endocarditis.

Patients hospitalized between May 2024 and March 2025 who met clinical, laboratory, and echocardiographic criteria compatible with infective endocarditis according to the Modified Duke Criteria were included. Medical records of patients diagnosed with IE were reviewed with attention to clinical presentation, laboratory findings—including blood cultures—and transthoracic and/or transesophageal echocardiography, the latter used to characterize vegetations (size and site of attachment), associated valvular dysfunction, and ventricular function impairment.

Selected patients underwent clinical evaluation and routine complementary examinations, including a detailed medical history, complete physical examination, and laboratory tests such as complete blood count, renal function, electrolytes (sodium, potassium, magnesium), C-reactive protein, and serial blood cultures. In addition, a 12-lead electrocardiogram (ECG), chest radiography, and transthoracic and/or transesophageal echocardiography were performed to assess vegetation characteristics, valvular function, and associated complications.

The time to diagnosis of infective endocarditis was defined as the interval from hospital admission to clinical, laboratory, or imaging confirmation of the diagnosis. Length of hospital stay was calculated in days from admission to hospital discharge or death. In patients who underwent surgical treatment, the time between admission and surgery was recorded, as well as early postoperative complications, when available.

Therapeutic strategies were analyzed, including the antimicrobial regimen used, guided by culture results and antimicrobial susceptibility, and the indication for or performance of cardiac surgery. The outcomes evaluated were hospital discharge, outpatient follow-up, or death.

All information was obtained and organized from medical notes, diagnostic test results, and discharge summaries, with confidentiality and anonymity ensured in accordance with the ethical principles of clinical research.

The project complied with all ethical guidelines established by Resolution No. 466/2012 of the Brazilian National Health Council, ensuring data protection and research integrity. The study was approved by the Research Ethics Committee (CEP) under CAAE No. 92916525.6.0000.5075 (Appendix 1).

RESULTS

Of the nine patients analyzed, five were female and four were male. Regarding age, six patients were younger than 60 years and three were aged 60 years or older. Most patients were admitted for non-cardiological causes; only one patient was hospitalized due to initial

cardiological symptoms (dyspnea on minimal exertion, orthopnea, and lower-limb edema). The baseline characteristics of the sample are presented in Table 1.

The main reasons for hospital admission were neurological conditions, including subarachnoid hemorrhage, stroke, and brain abscess (3/9). Other causes included renal conditions (dialysis urgency and rupture of an arteriovenous fistula, in two patients), gastrointestinal bleeding (melena and hematochezia, in two patients), and polytrauma (one patient).

Among previous risk factors, the most notable were the use of a central venous catheter (CVC) or double-lumen catheter (DLC), skin infection (erysipelas), and a history of dental infection. Regarding underlying heart disease, heart failure with reduced ejection fraction (HFrEF), patent foramen ovale (PFO), and rheumatic valvular disease were identified.

Five patients had risk factors, three had pre-existing heart disease, and two presented both conditions. The most frequent risk factor was CVC use (5/9): two patients were on chronic hemodialysis, one had a DLC in the internal jugular vein prior to admission, and another underwent right internal jugular vein catheterization on the first day of hospitalization. Only one patient had a history of skin infection and one had a dental infection. Among the three patients with heart disease, each had a distinct condition (HFrEF, PFO, and mitral valve disease). Two patients had both risk factors and heart disease: one female patient with HFrEF, DLC use, and illicit drug use, and another with PFO, previous endocarditis, and dental infection. Only one patient had no identifiable risk factors or known heart disease.

Microbiological analysis identified five main bacterial pathogens: methicillin-resistant Staphylococcus aureus (MRSA), carbapenemase-producing Klebsiella pneumoniae (KPC), Acinetobacter baumannii, Enterococcus faecalis, and Staphylococcus epidermidis. Surgical samples from a brain abscess also yielded Aggregatibacter aphrophilus and Actinomyces georgiae.

Six patients had positive blood cultures, frequently involving multidrug-resistant organisms. Three patients had cultures positive for KPC, two for MRSA, one for Enterococcus faecalis, and one for Staphylococcus epidermidis (considered probable contamination). The patient with a brain abscess had negative blood cultures, but positive surgical cultures for Aggregatibacter aphrophilus and Actinomyces georgiae. Overall, three patients had persistently negative blood cultures, a situation commonly observed in a subset of infective endocarditis cases and one that complicates etiological diagnosis.

The first imaging modality suggestive of vegetation was transthoracic echocardiography (TTE) in seven patients, whereas in two patients, the initial diagnosis was established by transesophageal echocardiography (TEE). The mitral valve was the most frequently affected, followed by the aortic valve and the right atrium, with one case of multivalvular involvement. The tricuspid valve was affected in only one patient.

Seven patients had vegetations with an initial size greater than 10 mm, ranging from 13.1 mm to 33 × 6 mm, with a mean size of 20.5 mm. In two cases, the initial vegetation size was not described. During treatment, only one patient showed complete resolution of the vegetation; three exhibited partial reduction, without reaching sizes below 10 mm; one patient showed increase in vegetation size (comparison between TTE and TEE); and in two patients, no follow-up echocardiographic studies were performed, both of whom progressed to death.

According to the Modified Duke Criteria, six patients were classified as having definite infective endocarditis and three as possible infective endocarditis. All patients met a major

criterion due to imaging evidence of vegetation. Two patients fulfilled major criteria based on typical positive blood cultures and compatible imaging findings. The most frequent minor criteria were the presence of a cardiovascular device (CVC), positive blood cultures not meeting major criteria, fever, and valvular disease. Less frequent criteria included illicit drug use, previous endocarditis, congenital heart disease (PFO), brain abscess, and embolic stroke.

All patients initiated empirical antibiotic therapy during the period of clinical suspicion. After microbiological results became available, six patients received targeted therapy, while three remained on empirical therapy, one of whom had treatment guided by surgical culture results. A total of 11 different antibiotics were used, with ceftriaxone and ampicillin being the most common, as well as broad-spectrum agents such as vancomycin, linezolid, meropenem, and tigecycline.

Three patients had an indication for cardiac surgery due to vegetation size and valvular complications; however, only one patient (case 7) underwent surgery during hospitalization, with replacement of the mitral and aortic valves using biological prostheses. The remaining patients awaited elective surgery. One patient (case 6), with pulmonary arteriovenous malformation (AVM) and PFO, was referred for embolization after clinical treatment.

Regarding outcomes, three patients were discharged with cured endocarditis, two were discharged while awaiting elective cardiac surgery, and one was discharged for treatment of a non-cardiac condition. Two patients died (cases 8 and 9), both classified as possible infective endocarditis according to the Duke criteria.

Length of hospital stay exceeded four weeks in most cases (8/9), reflecting the complexity of clinical management, the need for prolonged antibiotic therapy, and multidisciplinary care. Only one patient had a hospital stay shorter than four weeks due to rapid progression to death.

In summary, the patient profile was predominantly women under 60 years of age, admitted for non-cardiological causes, with neurological manifestations being the most common. The primary risk factor was CVC use, and structural heart disease was present in three cases. Most patients had positive blood cultures, frequently involving KPC. TTE was the most commonly used diagnostic modality, with predominant involvement of the mitral valve and vegetations larger than 10 mm. Despite disease severity, most patients were discharged, although two patients died. The collected data are presented in Tables 2 and 3.

Table 1. Baseline characteristics of the study population

Patient	Sex*	Age	Date of Admission	Reason for Admission*	Risk Factor / Pre-existing Heart Disease	Blood Culture
1	F	< 60 years	05/13/2024	Subarachnoid hemorrhage	Risk factor present	Positive
2	M	≥ 60 years	08/23/2024	Embolic stroke	Risk factor present	Positive
3	M	< 60 years	07/09/2024	Polytrauma	Risk factor present	Positive

4	F	< 60 years	08/26/2024	Dialysis urgency	Risk factor present	Positive
5	F	< 60 years	10/31/2024	Rupture of arteriovenous fistula	Risk factor present + Pre-existing heart disease	Positive
6	M	< 60 years	09/25/2024	Brain abscess Nonspecific symptoms + gastrointestinal bleeding + persistent fever	Risk factor present + Pre-existing heart disease	Negative
7	F	< 60 years	03/01/2025		Absent	Negative
8	M	≥ 60 years	11/06/2024	Gastrointestinal bleedingI + acute kidney injury (AKI) + anemia + erysipelas + pulmonary infection	Risk factor present	Positive (suggestive of contamination)
9	F	< 60 years	jun/25	Cardiac decompensation	Pre-existing heart disease	Negative

*Sex (F – Female; M – Male); Reason for admission (GI – Gastrointestinal tract; AKI – Acute Kidney Injury).
Source: Authors, 2026

Table 2: Echocardiographic characteristics, Duke criteria, and time to diagnosis in patients with suspected or confirmed infective endocarditis

Patient	First examination showing an image suggestive of vegetation	Affected valve	Vegetation size	Duke criterion	Diagnosis	Time to diagnosis
1	ECOTE	Aortic	≥ 10 mm	Definite	Definite infective endocarditis	58 days

2	ECOTT	Mitral	≥ 10 mm	Definite	Definite infective endocarditis with embolic stroke and leaflet perforation	5 days
3	ECOTT	Right atrium	< 10 mm	Definite	Definite infective endocarditis	19 days
4	ECOTT	Aortic	≥ 10 mm	Definite	Definite infective endocarditis	46 days
5	ECOTT	Tricuspid	≥ 10 mm	Definite	Definite infective endocarditis with embolic stroke and leaflet perforation	7 days
6	ECOTE	Right atrium	≥ 10 mm	Definite	Definite infective endocarditis with brain abscess (embolization)	26 days
7	ECOTT	More than one valve involved	≥ 10 mm	Possible	Possible infective endocarditis with bivalvular regurgitation	7 days
8	ECOTT	Mitral	≥ 10 mm	Possible	Possible infective endocarditis	5 days
9	ECOTT	Mitral	< 10 mm	Possible	Possible infective endocarditis involving a prosthetic valve	4 days

Legend: TTE: transthoracic echocardiography; TEE: transesophageal echocardiography.
Source: Authors, 2026

Table 3: Therapeutic management, surgical indication, clinical outcomes, and length of hospital stay in patients with infective endocarditis

Patient	Antibiotic treatment	Surgery indicated	Outcome	Length of hospital stay
1	Culture-guided therapy	Not indicated	Hospital discharge / cured	> 28 days
2	Culture-guided therapy	Cardiac	Hospital discharge while awaiting cardiac surgery	> 28 days
3	Culture-guided therapy	Not indicated	Hospital discharge / cured	> 28 days
4	Guided by culture from other sites – surgical specimen collected from a brain abscess	Non-cardiac, such as embolization of pulmonary arteriovenous malformation (AVM)	Discharged while awaiting non-cardiac surgery	> 28 days
5	Not guided by blood culture	Cardiac	Discharged after cardiac surgery	> 28 days
6	Culture-guided therapy	Not indicated	Death	> 28 days
7	Culture-guided therapy	Cardíaca	Discharged after cardiac surgery	> 28 days
8	Culture-guided therapy	Not indicated	Death	> 28 days
9	Not guided by blood culture	Not indicated	Death	< 28 days

Source: Authors, 2026

DISCUSSION

The diagnosis of infective endocarditis (IE) in the analyzed cases was established through the integration of clinical, microbiological, and imaging findings, in accordance with the Modified Duke Criteria, which include positive blood cultures and echocardiographic evidence of vegetations. Consistent with the literature, initial suspicion frequently arose in the setting of persistent fever associated with a history of invasive procedures or embolic events. In some patients, the simultaneous presence of positive blood cultures and vegetations detected on transesophageal echocardiography (TEE) allowed diagnostic confirmation, reinforcing the central role of the multimodal approach recommended by current guidelines.[1]

In this context, the identified risk factors corroborate previously described findings[1,2,3], particularly the presence of pre-existing structural heart disease, such as valvular insufficiency and patent foramen ovale, as well as the use of intravascular devices, immunosuppression, recent surgical procedures, and poor dental conditions. Patients undergoing dialysis therapy exhibited a particularly high risk, in agreement with studies[1,2,3,4] that associate frequent manipulation of vascular access with an increased incidence of IE. Additionally, a history of severe trauma and polytrauma emerged as a contributory factor, possibly related to prolonged hospital exposure and intensive use of invasive devices.

Echocardiography, both transthoracic and transesophageal, proved fundamental for the identification of vegetations, assessment of valvular function, and detection of structural complications such as leaflet perforations and significant valvular regurgitation. In some cases, vegetations were located at unusual sites, such as the junction of the superior vena cava and the right atrium, a pattern predominantly described in catheter-related endocarditis. Serial blood cultures played a crucial role not only in diagnosis but also in guiding antimicrobial therapy and monitoring therapeutic response. Complementary imaging studies, including computed tomography and magnetic resonance imaging, were useful in the investigation of neurological and pulmonary complications, in line with international recommendations.[1]

With regard to treatment, prolonged, culture-guided antibiotic therapy predominated, with treatment durations ranging from four to six weeks, as recommended by guidelines. Combination regimens were employed, including ceftriaxone, ampicillin, vancomycin, linezolid, gentamicin, and meropenem, adjusted according to the susceptibility profile of isolated microorganisms. In infections caused by multidrug-resistant pathogens, such as Klebsiella pneumoniae and Acinetobacter baumannii, the use of polymyxin B and combination therapies was required, a scenario more frequently described in healthcare-associated infective endocarditis.

Despite adequate clinical therapy, some patients had a formal indication for cardiac surgery due to structural complications such as leaflet perforation and severe valvular regurgitation. However, similarly to what is observed in other public healthcare settings, surgical intervention was limited by logistical constraints and limited availability, resulting in hospital discharge with outpatient referral for elective surgical evaluation.

Observed complications included neurological events, such as ischemic stroke due to septic embolization and brain abscesses, as well as heart failure, valvular perforations,

and pulmonary complications, including hemopneumothorax and ventilator-associated pneumonia. In cases of right-sided or catheter-related endocarditis, a higher risk of septic pulmonary embolization was observed, a finding widely reported in the literature.[6,7] Mechanical ventilation was required in critically ill patients, particularly in the presence of neurological or respiratory instability or during surgical procedures, with subsequent intensive care unit admission and one episode of self-extubation. In other patients, less invasive ventilatory support strategies were adopted, consistent with approaches aimed at preventing complications related to prolonged mechanical ventilation.

Clinical evolution was favorable in most cases following completion of antibiotic therapy, with resolution of fever, hemodynamic stabilization, and blood culture sterilization. Some patients were discharged with residual vegetations, a finding consistent with the literature, which describes aseptic persistence of these structures due to fibrin deposition, without necessarily indicating therapeutic failure.[1,5] From a complementary diagnostic standpoint, all patients underwent electrocardiography, which, as expected, demonstrated low diagnostic specificity. Its primary value lies in the detection of potential complications, such as perivalvular abscesses, suggested by new conduction abnormalities, particularly PR interval prolongation, a finding not observed in this series. Similarly, chest radiography provided limited information for the direct diagnosis of IE, with its use being more related to global clinical assessment, as recommended by European guidelines.[6,7]

Regarding nosocomial risk factors, there was a high frequency of prior exposure to central venous catheters, identified in at least five patients, in addition to three patients undergoing dialysis therapy. The association between CVC use, hemodialysis, and comorbidities such as chronic kidney disease and diabetes mellitus reinforces the profile of healthcare-associated infective endocarditis, which predominated in this series.[1]

From an echocardiographic perspective, vegetations were identified by transthoracic echocardiography in 7 of 9 cases, whereas in 2 cases the diagnosis relied exclusively on TEE, particularly in catheter-related endocarditis and atypical locations. In one case, both modalities were concordant. These findings reflect the higher diagnostic yield of TEE in specific clinical scenarios, as highlighted in current guidelines.[7]

The mitral valve was the most frequently affected (3/9), followed by the aortic valve (2/9), with a predominance of large vegetations (≥10 mm) in 8 of 9 cases. During treatment, reduction or disappearance of vegetations was observed in at least three patients, without evidence of progressive growth, in agreement with data indicating that morphological evolution alone is not an isolated marker of therapeutic success.[8]

From a microbiological standpoint, blood culture positivity was observed in 7 of 9 cases, with a predominance of Gram-negative bacilli in nosocomial settings, partially contrasting with international series in which Staphylococcus aureus is the most frequently isolated pathogen. The rate of culture-negative endocarditis (22%) was within the range reported in the literature, often associated with prior antibiotic use or fastidious microorganisms.[9,10] According to the Modified Duke Criteria, three patients met criteria for definite infective endocarditis and six for possible infective endocarditis, reflecting the predominance of major criteria related to imaging and microbiology and minor criteria associated with predisposition and fever, a pattern similar to that observed in hospital-based series.[1,11]

Regarding outcomes, seven patients were discharged and two died, both with infections caused by multidrug-resistant Gram-negative bacilli. Neither had documented surgical indication, and in one case death occurred only a few days after echocardiographic confirmation, highlighting the severity of IE in nosocomial infection contexts.

Finally, three patients were referred for elective cardiac surgery evaluation, following classical surgical indication criteria described in current guidelines[1]. In summary, this case series reflects a profile of predominantly healthcare-associated infective endocarditis, characterized by high exposure to central venous catheters and dialysis, large vegetations, complex microbiology, and management aligned with contemporary recommendations.

As study limitations, the small sample size restricts generalizability of the findings. Additionally, the lack of transesophageal echocardiography availability for all cases may have limited diagnostic accuracy, particularly in the detection of smaller vegetations and intracardiac complications, potentially leading to underestimation of disease severity in part of the sample.[10,11]

CONCLUSION

The analysis of the nine cases of infective endocarditis highlighted the complexity of diagnosis and management, particularly in patients with multiple comorbidities and a history of invasive procedures. Diagnostic confirmation was based on the rigorous application of the Modified Duke Criteria, supported by echocardiography and serial blood cultures, revealing a wide diversity of clinical presentations and etiologic agents, which reinforces the need for an individualized and multidisciplinary approach. Prolonged antibiotic therapy proved effective in most cases; however, limited timely access to cardiac surgery resulted in some patients being discharged while awaiting valvular correction, underscoring structural vulnerabilities within the healthcare system. These findings emphasize the importance of early diagnosis, particularly in high-risk populations, combined with appropriate antimicrobial therapy, continuous monitoring, and careful surgical indication, as well as early outpatient follow-up and patient education—essential measures to reduce complications, mortality, and recurrence.

REFERENCES

1. Delgado V, Ajmone Marsan N, de Waha S, Bonaros N, Brida M, Burri H, Caselli S, Doenst T, Ederhy S, Erba PA, Foldager D, Fosbøl EL, Kovac J, Mestres CA, Miller OI, Miro JM, Pazdernik M, Pizzi MN, Quintana E, Rasmussen TB, Ristić AD, Rodés-Cabau J, Sionis A, Zühlke LJ, Borger MA; ESC Scientific Document Group. 2023 ESC Guidelines for the management of endocarditis. Eur Heart J. 2023 Oct 14;44(39):3948-4042. Erratum in: Eur Heart J. 2023 Dec 1;44(45):4780. Erratum in: Eur Heart J. 2024 Jan 1;45(1):56.Erratum in: Eur Heart J. 2025 Mar 13;46(11):1082.

2. Habib G, Erba PA, Iung B, Donal E, Cosyns B, Laroche C, Popescu BA, Prendergast B, Tornos P, Sadeghpour A, Oliver L, Vaskelyte JJ, Sow R, Axler O, Maggioni AP, Lancellotti P; EURO-ENDO Investigators. Clinical presentation, aetiology and outcome of infective endocarditis. Results of the ESC-EORP EURO-ENDO (European infective endocarditis) registry: a prospective cohort study. Eur Heart J. 2019 Oct 14;40(39):3222-3232. Erratum in: Eur Heart J. 2020 Jun 7;41(22):2091.

3. Chen H, Zhan Y, Zhang K, Gao Y, Chen L, Zhan J, Chen Z, Zeng Z. The Global, Regional, and National Burden and Trends of Infective Endocarditis From 1990 to 2019: Results From the Global Burden of Disease Study 2019. Front Med (Lausanne). 2022 Mar 9;9:774224.

4. Pericàs JM, Llopis J, Jiménez-Exposito MJ, Kourany WM, Almirante B, Carosi G, Durante-Mangoni E, Fortes CQ, Giannitsioti E, Lerakis S, Montagna-Mella R, Ambrosioni J, Tan RS, Mestres CA, Wray D, Pachirat O, Moreno A, Chu VH, de Lazzari E, Fowler VG Jr, Miró JM; ICE Investigators. Infective Endocarditis in Patients on Chronic Hemodialysis. J Am Coll Cardiol. 2021 Apr 6;77(13):1629-1640.

5. Barbieri A, Cecchi E, Bursi F, Mantovani F. Is Infectious Endocarditis Evolving into a Time-Dependent Diagnosis in the Contemporary Epidemiological Era? Emphasis on the Role of Echocardiography as a First-Line Diagnostic Approach. Rev Cardiovasc Med. 2023 Oct 8;24(10):283.

6. Naber CK, Erbel R. Infective endocarditis with negative blood cultures. Int J Antimicrob Agents. 2007 Nov;30 Suppl 1:S32-6.

7. Freling SR, Richie I, Norwitz D, Canamar CP, Banerjee J, Davar K, Clark D, Spellberg B. Interpreting Blood Culture Results as Early Guidance for Infective Endocarditis. JAMA Netw Open. 2025 May 1;8(5):e258079.

8. Mihos CG, Nappi F. A narrative review of echocardiography in infective endocarditis of the right heart. Ann Transl Med. 2020 Dec;8(23):1622.

9. Imran A, Quarrell A, Edhem L, Eni G, Ahmed A, Solano J. Prosthetic Valve Endocarditis and Aortic Root Abscess: A Case of High-Risk Infection. Cureus. 2025 Apr 11;17(4):e82063.

10. Horgan SJ, Mediratta A, Gillam LD. Cardiovascular Imaging in Infective Endocarditis: A Multimodality Approach. Circ Cardiovasc Imaging. 2020 Jul;13(7):e008956.

11. Fowler VG, Durack DT, Selton-Suty C, Athan E, Bayer AS, Chamis AL, Dahl A, DiBernardo L, Durante-Mangoni E, Duval X, Fortes CQ, Fosbøl E, Hannan MM, Hasse B, Hoen B, Karchmer AW, Mestres CA, Petti CA, Pizzi MN, Preston SD, Roque A, Vandenesch F, van der Meer JTM, van der Vaart TW, Miro JM. The 2023 Duke-International Society for Cardiovascular Infectious Diseases Criteria for Infective Endocarditis: Updating the Modified Duke Criteria. Clin Infect Dis. 2023 Aug 22;77(4):518-526. Erratum in: Clin Infect Dis. 2023 Oct 13;77(8):1222.

MAILING ADDRESS

GIULLIANO GARDENGHI
CET – CLIANEST, R. T-32, 279 - St. Bueno, Goiânia-Goiás- Brazil.
E-mail: coordenacao.cientifica@ceafi.edu.br

EDITORIAL AND REVIEW

Authors:
Gabriella Torrano Carvalho Pimentel - http://lattes.cnpq.br/9259082959498289 - https://orcid.org/0009-0002-2399-360X

Luciana Fernandes Balestra - http://lattes.cnpq.br/2947425938390393 - https://orcid.org/0009-0006-0123-357X

Giulliano Gardenghi - http://lattes.cnpq.br/1292197954351954 - https://orcid.org/0000-0002-8763-561X

Library Review: Izabella Goulart
Spell Check: Dario Alvares
Received: 02/05/2026. Accepted: 05/02/26. Published in: 23/02/2026.

SCIENTIFIC JOURNAL
CEREM-GO
DOI 10.37951/2675-5009.2025v6i18.184
ISSN 2675-5009
e26635
SCIENTIFIC ARTICLE - ORIGINAL

PREVALENCE OF PREVIOUSLY UNDIAGNOSED HEART DISEASE IN PATIENTS ADMITTED WITH ACUTE ISCHEMIC STROKE TO AN EMERGENCY HOSPITAL IN GOIÁS

FREDERICO PORTO LUCIANO COIMBRA[1], LUCIANA FERNANDES BALESTRA[1,2], GIULLIANO GARDENGHI [3,4]

1. Hospital de Urgências de Goiás Dr. Valdemiro Cruz – Goiânia/GO, Brazil.
2. Hospital do Coração Anis Rassi – Goiânia/GO, Brazil.
3. Centro de Ensino e Treinamento da Clínica de Anestesia – Goiânia/GO, Brazil.
4. Hospital ENCORE – Aparecida de Goiânia/GO, Brazil.

ABSTRACT

Introduction: Ischemic stroke is one of the leading causes of death worldwide, accounting for approximately 11% of all deaths. It is also a leading cause of functional disability in adults, with significant loss of autonomy and progressive cognitive decline. Several risk factors are associated with stroke, such as systemic arterial hypertension, diabetes mellitus, dyslipidemia, atrial fibrillation, and heart failure. Early detection of heart disease, especially in patients recently diagnosed with stroke, is essential for appropriate treatment and improved prognosis. However, there is a lack of studies evaluating the prevalence of previously undiagnosed heart disease in patients hospitalized for ischemic stroke. Objective: To identify the main undiagnosed heart diseases in patients hospitalized for acute ischemic stroke. **Methods:** retrospective, observational, descriptive study, analyzing the medical records of patients admitted to the Dr. Valdemiro Cruz Emergency Hospital of Goiás in July, August, September, October, November, and December 2024. Data collection included demographic information, risk factors, comorbidities, and diagnoses made during hospitalization, with an emphasis on previously unknown cardiac diseases such as arrhythmias, heart failure with reduced ejection fraction, intracavitary thrombi, moderate or severe valvular disease, and patent foramen ovale. The data were tabulated in Microsoft Excel® and presented descriptively. **Results:** During hospitalization, atrial fibrillation/flutter was observed in 14.9% of patients, Heart failure with mildly reduced or reduced ejection fraction in 12.4%, left ventricular segmental contractility abnormalities in 14.5%, and moderate or severe valve regurgitation or stenosis in 15.9% of patients. Left ventricle thrombus was also observed in 1.4% of patients and patent foramen ovale in 4.5%. **Conclusion:** In this study, we observed a high prevalence of underdiagnosed cardiac diseases in patients hospitalized due to acute ischemic stroke.

Keywords: Stroke; Early diagnosis; Cardiovascular diseases; Risk factors; Primary prevention.

INTRODUCTION

Ischemic stroke (IS) is one of the leading causes of death worldwide, accounting for approximately 11% of all deaths.[1] In Brazil, between 2019 and 2023, there were 174,626

deaths due to ischemic stroke, predominantly affecting elderly men.[2] In addition, stroke is one of the main causes of disability in adulthood. Severe or recurrent strokes can lead to cognitive decline and functional impairment.[3] Nearly half of stroke survivors require assistance with at least one basic activity of daily living six months after the event.[4]

Comorbidities such as systemic arterial hypertension, diabetes mellitus, dyslipidemia, heart failure, and arrhythmias are classically associated with the occurrence of stroke. With better adherence to prevention programs, early detection, and appropriate treatment of these risk factors, many events could be avoided.[5]

Atrial fibrillation (AF) is the most common arrhythmia in clinical practice, affecting approximately 50 million people worldwide, particularly the elderly.[6] It increases the risk of ischemic stroke by five to nine times, with a progressive increase with advancing age, and accounts for approximately 20% of cases.[7] A cross-sectional analysis of the ELSA-Brasil study showed a prevalence of atrial fibrillation of 2.5% among participants, similar to that found in other international studies. A low rate of anticoagulant use was also observed, with only 10.8% of patients with an indication receiving anticoagulation therapy. Among these, a lower tendency toward use was noted in younger patients and women.[8]

Heart failure also has a high prevalence in the general population, affecting an estimated 3 million Brazilians. Between 2008 and 2018, it was responsible for more than 2 million hospitalizations within the Brazilian Unified Health System (SUS), resulting in over 252,000 deaths.[9] Atrial fibrillation is frequently associated with heart failure and may be present in up to 50% of severe cases.[10]

Degenerative valvular heart diseases have become increasingly prevalent due to population aging. In less developed regions of Brazil, valvular diseases of rheumatic etiology remain a concern among young adults. In advanced stages, these conditions may contribute to the development of atrial fibrillation and progression to heart failure with reduced ejection fraction, increasing the risk of stroke.[11]

Early detection of heart diseases is essential for preventing severe adverse cardiovascular outcomes. The identification of previously undiagnosed atrial fibrillation after an ischemic stroke changes both therapeutic management and patient prognosis.[12] Despite the relevance of this topic, there are no studies addressing the prevalence of previously undiagnosed heart diseases in patients who experienced acute ischemic stroke.

The primary objective of this study was to identify the main previously undiagnosed heart diseases in patients hospitalized due to acute ischemic stroke.

METHODOLOGY

This is an observational, retrospective, and descriptive study, based on the analysis of electronic medical records of patients admitted to the Hospital de Urgências de Goiás due to acute ischemic stroke.

Patient identification was performed using ICD code I64 in the MVPEP/MVSOUL® electronic medical record system used by the hospital. Patients admitted to the Hospital de Urgências de Goiás in July, August, September, October, November, and December 2024 due to acute ischemic stroke, with diagnosis confirmed by imaging studies, were included in the study. Patients who did not meet criteria for ischemic stroke and those

seen only for outpatient follow-up were excluded.

Data collected from the electronic medical records were transcribed into a standardized evaluation table designed for the study. Medical records were reviewed individually, assessing diagnoses and risk factors reported by the patient or family members at admission, as well as diagnoses established after screening examinations during hospitalization, with particular focus on previously undiagnosed cardiac diseases.

To characterize the sample, personal data such as age and sex were collected, in addition to prior comorbidities and risk factors, including systemic arterial hypertension, diabetes mellitus, dyslipidemia, coronary artery disease, chronic kidney disease, atrial fibrillation/flutter, heart failure, and previous stroke. Subsequently, the medical records were reviewed again to identify cardiac diseases diagnosed during hospitalization, such as atrial fibrillation/flutter, heart failure with reduced ejection fraction, intracavitary thrombi, moderate or severe valvular heart disease, and patent foramen ovale. The collected data were then tabulated using Microsoft Excel® version 2021 and analyzed descriptively.

This study was ethically approved by the Research Ethics Committee of HUGOL (CEP-HUGOL) under opinion number CAAE: 89872425.5.0000.0237.

RESULTS

A total of 510 medical records were analyzed, of which 279 patients (54.7%) were male and 231 (45.3%) were female (Table 1). The mean age of the patients was 67.3 years, with a standard deviation of 14.2.

Table 1. Distribution of patients hospitalized with ischemic stroke from June to December 2024 according to sex, with N: total number of patients; %: percentage of total patients.

Sex	N	%
Male	279	54.7%
Female	231	45.3%

Regarding stroke etiology, the TOAST classification (Trial of ORG 10172 in Acute Stroke Treatment) was used. Forty patients (7.6%) were classified as TOAST 1 (large-artery atherosclerosis), 119 (23.3%) as TOAST 2 (cardioembolic), 5 (1.0%) as TOAST 3 (small-vessel occlusion), 12 (2.4%) as TOAST 4 (other determined cause), and 334 (65.5%) as TOAST 5 (cryptogenic) (Table 2).

Table 2. Etiological classification of ischemic strokes, with N: total number of patients; %: percentage of total patients; AVC: stroke; TOAST: Trial of ORG 10172 in Acute Stroke Treatment.

TOAST	N	%
1	40	7.6%
2	119	23.3%
3	5	1.0%
4	12	2.4%
5	334	65.5%

Table 3 shows the prevalence of diseases and risk factors previously diagnosed before hospital admission. Among the patients analyzed, 370 (72.5%) had systemic arterial hypertension, 169 (33.1%) had diabetes mellitus, 89 (17.5%) had dyslipidemia, and 27 (5.3%) had chronic kidney disease. Regarding cardiac conditions, 28 (5.5%) had atrial fibrillation or flutter, 19 (3.7%) had heart failure with reduced ejection fraction (HFrEF), and 41 (8.0%) had chronic coronary artery disease (CAD) or had undergone coronary angioplasty. Finally, 100 patients (19.6%) had a history of one or more previous strokes.

Table 3. Diseases and risk factors prior to hospitalization, with N: total number of patients; %: percentage of total patients; HFrEF: heart failure with reduced ejection fraction; CAD: coronary artery disease; PCI: percutaneous coronary intervention; Stroke: cerebrovascular accident.

Comorbidities and risk factors	N / %
Systemic arterial hypertension	370 / 72.5%
Diabetes mellitus	169 / 33.1%
Dyslipidemia	89 / 17.5%
Chronic kidney disease	27 / 5.3%
Atrial fibrillation or atrial flutter	28 / 5.5%
HFrEF	19 / 3.7%
CAD / PCI	41 / 8.0%
Previous stroke	100 / 19.6%

During hospitalization, atrial fibrillation or flutter was diagnosed in 76 (14.9%) patients, and 87 (17.1%) either did not undergo an electrocardiogram or did not have the report recorded in the medical chart. Table 4 shows the left ventricular ejection fraction of patients hospitalized with ischemic stroke. Overall, 29 (5.7%) patients were diagnosed with heart failure with mildly reduced ejection fraction (HFmrEF) and 34 (6.7%) with heart failure with reduced ejection fraction (HFrEF). Table 5 shows the echocardiographic abnormalities diagnosed during hospitalization. Segmental left ventricular wall motion abnormalities were identified in 74 (14.5%) patients, including some with preserved ejection fraction. Left ventricular thrombus was found in 7 (1.4%) patients. Regarding valvular heart disease, 81 (15.9%) patients were diagnosed with moderate or severe valvular regurgitation or stenosis. Additionally, 23 (4.5%) patients were diagnosed with patent foramen ovale. In total, 107 (21%) patients did not undergo echocardiography before discharge or death.

Figure 4. Left ventricular ejection fraction, with N: total number of patients; %: percentage of patients; LV: left ventricle

LVEF	N / %
>50%	340 / 66.7%
40-50%	29 / 5.7%
<40%	34 / 6.7%

Figure 5. Echocardiographic abnormalities diagnosed during hospitalization, with N: total number of patients; %: percentage of patients; LV: left ventricle; PFO: patent foramen ovale.

Echocardiographic abnormality	N / %
Segmental abnormality	74 / 14.5%
Left ventricular thrombus	07 / 1.4%
Valvular abnormality	81 / 15.9%
PFO	23 / 4.5%

DISCUSSION

To the best of the authors' knowledge, this is the first national study evaluating the prevalence of cardiac diseases diagnosed during hospitalization of patients with acute ischemic stroke.

It is classically known that comorbidities such as systemic arterial hypertension, diabetes mellitus, dyslipidemia, heart failure, and arrhythmias are related to the occurrence of

stroke, and that with better adherence to prevention programs, early detection, and adequate treatment of these risk factors, many events could be avoided.[5]

The percentage of underdiagnosed cardiac diseases in the general population varies according to the specific condition, the population studied, and the diagnostic methods used. Recent studies suggest that underdiagnosis of cardiac diseases is a significant and multifactorial problem.

Isolated atrial fibrillation (AF) is responsible for approximately 20% of ischemic strokes.[7] Estimates in the United States indicate that between 11% and 23% of cases may be underdiagnosed.[13] In a study using a back-calculation approach, it was estimated that in 2009, 13.1% of AF cases in the United States were not diagnosed, and more than half of this population had a moderate to high risk of stroke.[14] In our analysis, only 5.5% of patients had a previous diagnosis of atrial fibrillation, while nearly three times as many patients (14.9%) received a diagnosis of atrial fibrillation during hospitalization, which was considered the cause of the stroke.

A study conducted in England estimated that approximately 20% of cases of coronary artery disease (CAD) remain underdiagnosed prior to death or severe complications.[15] A retrospective Swiss cohort evaluated 648 autopsies over three years and identified CAD in 24% of patients and acute or subacute myocardial infarction in 15%.[16] In our study, echocardiographic findings showed that 14.5% of patients had some degree of left ventricular segmental wall motion abnormality, suggesting a possible diagnosis of CAD. These patients were referred for outpatient follow-up after discharge for further investigation.

In heart failure, systematic reviews show underdiagnosis and/or misdiagnosis rates ranging from 16% in hospital settings to 68% in primary care referrals to specialists, reflecting the difficulty in distinguishing heart failure from other conditions such as chronic obstructive pulmonary disease (COPD).[17] In our cohort, 12.4% of patients were diagnosed with heart failure with mildly reduced or reduced ejection fraction, all without prior appropriate pharmacological treatment or guidance.

Patent foramen ovale (PFO) is associated with ischemic stroke, particularly in young patients with stroke of undetermined origin. It is found in approximately 25% of the general population, but in up to 50% of patients with cryptogenic stroke under 60 years of age, suggesting a causal relationship in many cases.[18] In young patients without traditional risk factors and with high-risk anatomical PFO, percutaneous closure significantly reduces the risk of recurrent ischemic stroke.[19] Therefore, its diagnosis is essential to improve prognosis and survival. In our study, patients underwent only transthoracic echocardiography due to the lack of transesophageal echocardiography at our institution, which made more accurate stratification and measurement of PFO during hospitalization impossible. In selected cases, patients were referred for further investigation after discharge.

Finally, monogenic cardiac diseases such as hereditary cardiomyopathies and genetic arrhythmias present even higher rates of underdiagnosis. A Swiss retrospective autopsy cohort identified clinically undiagnosed cardiac amyloidosis in 8% of patients.[16] In a cohort of patients undergoing cardiac catheterization, only about 35% of individuals with pathogenic genetic variants and clinical criteria for monogenic disease had a documented diagnosis, suggesting that approximately 65% of these cases remain underdiagnosed.[20] In

our study, patients were not submitted to genetic testing due to the unavailability of this examination at our service.

In populations from low- and middle-income countries, such as India, a study based on symptoms and self-report suggests that the prevalence of undiagnosed heart disease may be substantial, especially among middle-aged and elderly adults, although data are less precise and rely on indirect methods.[21]

Clinical, sociodemographic, and healthcare access factors are associated with underdiagnosis of cardiac diseases. The presence of atypical or absent symptoms in women and older adults is an important factor in the underdiagnosis of myocardial infarction.[22,23] The presence of other comorbidities such as chronic lung disease, anemia, and renal failure may confound the clinical picture, leading to misattribution of symptoms and delayed diagnosis.[17] Psychiatric conditions such as depression, anxiety, and psychosocial stress are nontraditional factors that increase cardiovascular risk and may contribute to underdiagnosis, as their symptoms may be attributed to psychosomatic causes or underestimated.[24]

Socioeconomic factors and social determinants of health, such as low educational level, lower income, limited access to healthcare services, inadequate social support, and cultural barriers, hinder early diagnosis and appropriate management of cardiac diseases, especially in vulnerable populations.[24] The lack of diagnostic resources is also a limiting factor, particularly for valvular heart disease. Cardiac auscultation alone has limited sensitivity for detection, especially in older adults and in cases of mitral or aortic regurgitation. The absence of a murmur does not exclude significant disease, making complementary imaging methods such as echocardiography necessary, particularly in high-risk groups.[25]

This study has limitations inherent to its retrospective design based on medical record review, which precludes follow-up of the included individuals. In addition, incomplete medical records may have occurred, a bias beyond the authors' control. In 87 records (17.1%), the electrocardiogram report was not documented, making it impossible to determine whether the test was not performed or simply not recorded. In some cases, due to hospital overcrowding, the neurology team opted for early discharge with outpatient follow-up for complementary tests; however, some patients did not attend follow-up visits. Finally, given that stroke is a severe and potentially fatal condition, in some cases there was insufficient time to complete the etiological investigation. In total, 107 patients (21%) did not undergo echocardiography before discharge or death. Therefore, it is possible that the findings of this study are underestimated and that the true number of underdiagnosed cardiac diseases is higher.

CONCLUSION

In the present study, the results demonstrated a high prevalence of underdiagnosed cardiac diseases in patients hospitalized with acute ischemic stroke, particularly atrial fibrillation/flutter, heart failure, and moderate to severe valvular abnormalities. Echocardiographic findings highly suggestive of the ischemic stroke etiology were also identified, such as left ventricular thrombus, as well as findings that require further investigation to establish an etiological diagnosis, such as patent foramen ovale (PFO). It

can therefore be concluded that, in a considerable proportion of cases, ischemic stroke represents the first clinical manifestation of underlying cardiac diseases that could have been previously diagnosed and treated. Thus, better adherence to prevention programs, early detection, and appropriate management of these risk factors could potentially prevent a significant number of such events.

REFERENCES

1. GBD 2019 Stroke Collaborators. Global, regional, and national burden of stroke and its risk factors, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet Neurol. 2021 Oct;20(10):795-820.

2. Santos JV, Leopoldino DJS, Silva ABB, Lima ACG, Teshima IENS, Oliveira Neto EB, Milones MESV, Santa Maria KC, Bomfim LC, Maranhão EBA, Duarte KF, Cordeiro KIC, Freitas SSF. Acidente vascular cerebral no Brasil: aspectos epidemiológicos da mortalidade no período de 2019 a 2023. Braz J Implantol Health Sci. 2025;7(3):1429–39.

3. Koton S, Pike JR, Johansen M, Knopman DS, Lakshminarayan K, Mosley T, Patole S, Rosamond WD, Schneider ALC, Sharrett AR, Wruck L, Coresh J, Gottesman RF. Association of Ischemic Stroke Incidence, Severity, and Recurrence With Dementia in the Atherosclerosis Risk in Communities Cohort Study. JAMA Neurol. 2022 Mar 1;79(3):271-280.

4. Kernan WN, Viera AJ, Billinger SA, Bravata DM, Stark SL, Kasner SE, Kuritzky L, Towfighi A; American Heart Association Stroke Council; Council on Arteriosclerosis, Thrombosis and Vascular Biology; Council on Cardiovascular Radiology and Intervention; and Council on Peripheral Vascular Disease. Primary Care of Adult Patients After Stroke: A Scientific Statement From the American Heart Association/American Stroke Association. Stroke. 2021 Aug;52(9):e558-e571.

5. Hankey GJ. Population impact of potentially modifiable risk factors for stroke. Stroke. 2020;51(3). doi: 10.1161/STROKEAHA.119.024154.

6. Joglar JA, Chung MK, Armbruster AL, Benjamin EJ, Chyou JY, Cronin EM, Deswal A, Eckhardt LL, Goldberger ZD, Gopinathannair R, Gorenek B, Hess PL. et al. 2023 ACC/AHA/ACCP/HRS guideline for the diagnosis and management of atrial fibrillation: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. Circulation. 2023;149(1).

7. Escudero-Martínez I, Morales-Caba L, Segura T. Atrial fibrillation and stroke: a review and new insights. Trends Cardiovasc Med. 2021;33(1).

8. Santos IS, Nunes VS, Goulart AC, Bensenor IM, Lotufo PA. Diagnóstico de fibrilação atrial na comunidade utilizando eletrocardiograma e autorrelato: análise transversal do ELSA-Brasil. Arq Bras Cardiol. 2021;117(3):426–34.

9. Arruda VL, Machado LMG, Lima JC, Silva PRS. Trends in mortality from heart failure in Brazil: 1998 to 2019. Rev Bras Epidemiol. 2022 Aug 12;25:E220021.

10. Sarullo FM, Fazio G, Di Pasquale P, Di Franco A, Favarò A, Rubino I. Mutual relationship between heart failure and atrial fibrillation. Monaldi Arch Chest Dis. 2020;90(4).

11. Oliveira GMM, Brant LCC, Polanczyk CA, Malta DC, Biolo A, Nascimento BR, Souza MFM, Lorenzo AR, Fagundes Júnior AAP, Schaan BD, Silva CGSE, Castilho FM, Cesena FHY, Soares GP, Xavier Junior GF, Barreto Filho JAS, Passaglia LG, Pinto Filho MM, Machline-Carrion MJ, Bittencourt MS, Pontes Neto OM, Villela PB, Teixeira RA, Stein R, Sampaio RO, Gaziano TA, Perel P, Roth GA, Ribeiro ALP. Cardiovascular Statistics - Brazil 2023. Arq Bras Cardiol. 2024 Feb;121(2):e20240079).

12. Proença T, Pinto RA, Carvalho MM, Sousa C, Dias P, Campelo M, Macedo F. Predictors of Atrial Fibrillation in Holter Monitoring after Stroke - A Ten Year Flashback. Arq Bras Cardiol. 2022 Aug;119(2):346-348.

13. Turakhia MP, Guo JD, Keshishian A, Delinger R, Sun X, Ferri M, Russ C, Cato M, Yuce H, Hlavacek P. Contemporary prevalence estimates of undiagnosed and diagnosed atrial fibrillation in the United States. Clin Cardiol. 2023 May;46(5):484-493.

14. Turakhia MP, Shafrin J, Bognar K, Trocio J, Abdulsattar Y, Wiederkehr D, Goldman DP. Estimated prevalence of undiagnosed atrial fibrillation in the United States. PLoS One. 2018 Apr 12;13(4):e0195088.

15. Anosova O, Head A, Collins B, Alexiou A, Darras K, Sutton M, Cookson R, Anselmi L, O'Flaherty M, Barr B, Kypridemos C. Estimating the burden of underdiagnosis within England: A modelling study of linked primary care data. PLoS One. 2025 Jan 15;20(1):e0313877.

16. Maccio U, Vitiello S, Capraro S, Marras F, Mattioli M, De Dominicis G. Clinically undiagnosed diseases in autopsies: frequency and risk factors. Arch Pathol Lab Med. 2024;149(1):60–6.

17. Wong CW, Tafuro J, Azam Z, Satchithananda D, Duckett S, Barker D, Patwala A, Ahmed FZ, Mallen C, Kwok CS. Misdiagnosis of Heart Failure: A Systematic Review

of the Literature. J Card Fail. 2021 Sep;27(9):925-933.

18. Kent DM, Wang AY. Patent foramen ovale and stroke: a review. JAMA. 2025.

19. Sposato LA, Albin CSW, Elkind MSV, Kamel H, Saver JL. Patent Foramen Ovale Management for Secondary Stroke Prevention: State-of-the-Art Appraisal of Current Evidence. Stroke. 2024 Jan;55(1):236-247.

20. Abdulrahim JW, Kwee LC, Alenezi F, Sun AY, Baras A, Ajayi TA, Henao R, Holley CL, McGarrah RW, Daubert JP, Truby LK, Vemulapalli S, Wang A, Khouri MG, Shah SH. Identification of Undetected Monogenic Cardiovascular Disorders. J Am Coll Cardiol. 2020 Aug 18;76(7):797-808.

21. Ahmed W, Muhammad T, Maurya C, Akhtar SN. Prevalence and factors associated with undiagnosed and uncontrolled heart disease: A study based on self-reported chronic heart disease and symptom-based angina pectoris among middle-aged and older Indian adults. PLoS One. 2023 Jun 28;18(6):e0287455.

22. Van Oortmerssen JAE, Ntlapo N, Tilly MJ, Bramer WM, den Ruijter HM, Boersma E, Kavousi M, Roeters van Lennep JE. Burden of risk factors in women and men with unrecognized myocardial infarction: a systematic review and meta-analysis †. Cardiovasc Res. 2024 Nov 25;120(14):1683-1692.

23. Van der Ende MY, Juarez-Orozco LE, Waardenburg I, Lipsic E, Schurer RAJ, van der Werf HW, Benjamin EJ, van Veldhuisen DJ, Snieder H, van der Harst P. Sex-Based Differences in Unrecognized Myocardial Infarction. J Am Heart Assoc. 2020 Jul 7;9(13):e015519.

24. Mehta LS, Velarde GP, Lewey J, Sharma G, Bond RM, Navas-Acien A, Fretts AM, Magwood GS, Yang E, Blumenthal RS, Brown RM, Mieres JH. Cardiovascular disease risk factors in women: the impact of race and ethnicity: a scientific statement from the American Heart Association. Circulation. 2023;147(19):1471–87.

25. Davidsen AH, Svendsen T, Kofoed M, Tarp L, Jensen K. Heart murmurs in the general population: diagnostic value and prevalence from the Tromsø Study. Heart. 2025; heartjnl-2024-325499.

MAILING ADDRESS

GIULLIANO GARDENGHI
CET – CLIANEST, R. T-32, 279 - St. Bueno, Goiânia-Goiás- Brazil.
E-mail: coordenacao.cientifica@ceafi.edu.br

EDITORIAL AND REVIEW

Chief editors:

Waldemar Naves do Amaral - http://lattes.cnpq.br/4092560599116579 - https://orcid.org/0000-0002-0824-1138
Tárik Kassem Saidah - http://lattes.cnpq.br/7930409410650712- https://orcid.org/0000-0003-3267-9866

Authors:

Frederico Porto Luciano Coimbra - http://lattes.cnpq.br/3533373536375060 - https://orcid.org/0000-0002-7088-7861

Luciana Fernandes Balestra - http://lattes.cnpq.br/2947425938390393 - https://orcid.org/0009-0006-0123-357X

Giulliano Gardenghi - http://lattes.cnpq.br/1292197954351954 - https://orcid.org/0000-0002-8763-561X

Library Review: Izabella Goulart
Spell Check: Dario Alvares
Received: 16/11/25. Accepted: 03/12/25. Published in: 05/01/2026.

SCIENTIFIC JOURNAL
CEREM-GO

DOI 10.37951/2675-5009.2025v6i18.183
ISSN 2675-5009
e26183
SCIENTIFIC ARTICLE - CASE REPORT

CLINICAL RELEVANCE OF CONGENITAL POSTERIOR CIRCULATION VARIANTS IN EXERCISE-INDUCED HEADACHE: A CASE REPORT

CECÍLIA LIMA GARCIA[1], JERÔNIMO DE ASSIS GARCIA NETO[2], ANA MARIA RAGANINI DALMASO[1], GUILHERME ARRUDA VILELA[3], JOSÉ MARTINS DE SOUZA NETO[4], LUÍS HENRIQUE DA SILVA LIMA[1]

1. Medical Resident at the Federal University of Jataí, Jataí/GO, Brazil.
2. General Practitioner, working in emergency care in Jataí, Jataí/GO, Brazil.
3. Medical Director of the UPA - Emergency Care Unit, Jataí/GO, Brazil.
4. Preceptor Physician for the Medical Residency Program at the Federal University of Jataí, Jataí/GO, Brazil.

ABSTRACT

Case report of a young adult with headache triggered by intense physical exertion who was found to have congenital posterior circulation variants, including fetal-type posterior cerebral artery and vertebral artery hypoplasia. The patient presented with unilateral pressure-like headache, photophobia, visual scotomas, and paresthesias after vigorous exercise, without symptoms during mild to moderate activity. Laboratory tests and brain CT were unremarkable. Angio–MRI revealed right fetal-type PCA and left vertebral artery hypoplasia. Current literature provides limited evidence regarding the relationship between these variants and non-ischemic manifestations such as exertional headache. This case highlights the potential hemodynamic implications of posterior circulation variants and reinforces the need for further research on their clinical significance.

Keywords: Headache, Congenital vascular anomaly, Fetal pattern, Vertebral artery hypoplasia, Physical exertion.

INTRODUCTION

Exercise-induced headache is recognized by the International Headache Society as a primary headache disorder that may occur after vigorous physical activity and is generally benign in nature. However, the presence of atypical features, refractoriness to standard management, or association with structural abnormalities warrants thorough investigation to exclude secondary causes.

Congenital variants of the posterior circulation, such as a fetal-type posterior cerebral artery (PCA) and vertebral artery hypoplasia (VAH), are relatively common in the general population and for decades have been regarded as incidental findings. Nevertheless, recent evidence

suggests that these variants may influence cerebral hemodynamics, vasodilatory reserve, and flow autoregulation, particularly under conditions of increased metabolic stress.

Despite growing interest in the role of these variants in ischemic events, few studies have addressed their potential association with non-ischemic manifestations, such as exercise-induced headache. The aim of this case report is to describe a patient with exercise-triggered headache who simultaneously presents a fetal-type PCA and vertebral artery hypoplasia, highlighting the potential clinical relevance of these anatomical variations.

CASE REPORT

A 30-year-old male patient, previously healthy, with a history of episodic migraine since the age of 17, began at the age of 30 to experience a new and recurrent pattern of headache triggered exclusively by intense physical exertion. The episodes typically occurred after high-intensity activities, such as high-intensity interval training (HIIT), and were not triggered by light or moderate exercise.

The headache was pulsatile, unilateral, and lasted between 2 and 48 hours. Episodes were accompanied by photophobia, scintillating scotomas described as “floaters,” dizziness, and transient paresthesia of the fingers. There were no headache episodes during exertion; all symptoms began after completion of physical activity. The patient denied a family history of primary headache disorders, stroke, fibromuscular dysplasia, or vascular malformations.

At admission, previously undiagnosed systemic arterial hypertension was identified (170 × 120 mmHg). Routine laboratory tests were within normal limits. Transthoracic echocardiography demonstrated concentric left ventricular remodeling. Exercise stress testing revealed an exaggerated hypertensive response without evidence of myocardial ischemia. Olmesartan 40 mg/day was initiated, resulting in normalization of blood pressure levels, but without reduction in headache frequency or intensity. Contrast-enhanced cranial computed tomography showed no abnormalities.

Given the refractoriness of symptoms and the exclusively post-exertional pattern, magnetic resonance angiography of the brain was performed, which revealed:

• Internal carotid arteries and their intracranial segments were patent, with no significant stenosis.
• Anterior and middle cerebral arteries showed no abnormalities.
• Right posterior cerebral artery demonstrated predominant supply from the posterior communicating artery, consistent with a fetal-type posterior cerebral artery.
• Left vertebral artery hypoplasia was identified, with preserved caliber of the right vertebral artery and the basilar artery.
•No aneurysms, arteriovenous malformations, or venous thrombosis were detected.

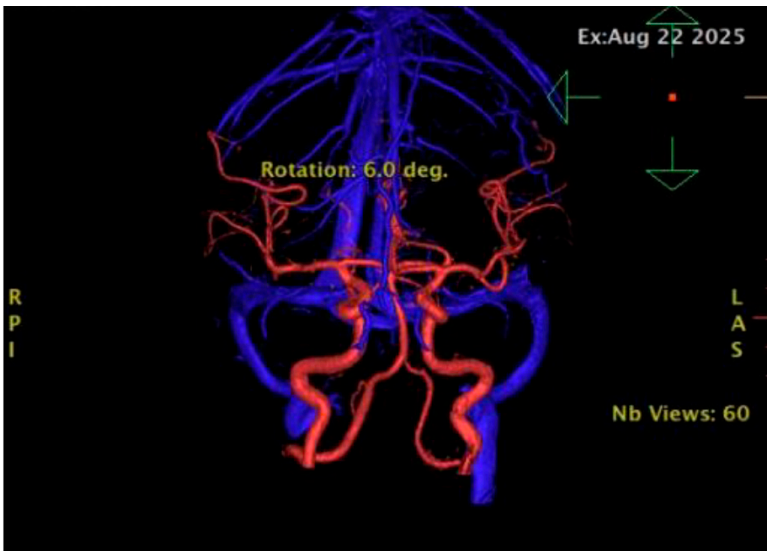

Figure 1. Cranial magnetic resonance angiography demonstrating hypoplasia of the left vertebral artery. Personal archive.

In light of these findings, further investigation was pursued with carotid and vertebral Doppler ultrasonography, performed later during clinical follow-up. The study demonstrated preserved antegrade flow, with no stenosis, occlusions, or findings suggestive of vertebral steal syndrome.

The patient was followed for approximately two years, with sustained blood pressure control and maintenance of a healthy body weight. Despite overall improvement in the cardiovascular profile, exertion-triggered headache persisted with stable characteristics, reinforcing the hypothesis that the identified congenital variants of the posterior circulation may play a modulatory role in the pathophysiology of the condition.

DISCUSSION

Congenital variants of the posterior circulation, such as the fetal-type posterior cerebral artery (PCA) and vertebral artery hypoplasia (VAH), result from alterations in the embryological development of the vertebrobasilar system. During embryogenesis, posterior cerebral circulation initially depends on the carotid system through the posterior communicating arteries. Persistence of this secondary supply, due to incomplete regression of the primordial connections, gives rise to the fetal-type PCA, in which the posterior cerebral artery receives predominant blood flow from the internal carotid artery rather than from the vertebrobasilar system.[1-3]

Vertebral artery hypoplasia, in turn, results from incomplete development of the cervical branches that form the vertebral artery, leading to caliber asymmetry and, in some cases, reduced hemodynamic contribution to the posterior circulation.[4–6] Although both conditions are considered common anatomical variants, they may carry potential clinical implications depending on the physiological context.[7]

Association between headache and posterior circulation variants

Although these variants have traditionally been classified as benign findings, a growing body of literature suggests a possible relationship between anatomical patterns of the Circle

of Willis and clinical manifestations, including primary or exertion-induced headaches. Recent studies have shown that structural asymmetries may influence vascular reactivity, regional hemodynamic reserve, and flow distribution during states of increased metabolic demand, such as vigorous exercise.[2,5,6,8,9,10]

Importantly, although the literature remains limited and heterogeneous, there are reports associating recurrent headaches, including exertional headache, with alterations such as vertebral artery hypoplasia and fetal-type posterior cerebral artery, particularly when these variants coexist.[2,3,5]

Proposed pathophysiological mechanisms include:

1. Reduction in vasodilatory reserve of the posterior circulation, leading to transient perfusion imbalance;
2. Asymmetry in the response to carbon dioxide and in neurovascular autoregulatory mechanisms;[9]
3. Predisposition to focal post-exercise hyperperfusion due to reduced capacity for flow accommodation;
4. Increased trigeminovascular sensitivity in migraine patients, modulated by anatomical variations.

Our patient presented with two potentially contributory factors:

- a right fetal-type posterior cerebral artery;
- left vertebral artery hypoplasia.

This combination may alter posterior circulation perfusion dynamics during conditions of abrupt increases in systemic blood flow, such as those occurring during high-intensity exercise.

At present, however, the evidence remains limited, and there is no consensus regarding a causal relationship between these variants and post-exertional headache, although recent publications suggest a plausible association that warrants further investigation.

RESULTS

Congenital variants of the posterior circulation, such as a fetal-type posterior cerebral artery and vertebral artery hypoplasia, are often considered incidental findings. However, this report reinforces that in symptomatic individuals, particularly those with exercise-triggered headache, these variants may act as anatomical modulators of regional hemodynamics and trigeminovascular sensitivity.

Although the available literature describes similar cases, systematic studies exploring the role of these variants in the pathophysiology of exertion-induced headache remain scarce. Thus, this case adds to the growing body of evidence suggesting that congenital vascular anomalies, whether isolated or combined, may have clinical relevance beyond incidental findings, supporting the need for further investigation through case series and population-based studies.

REFERENCES

1. Gaigalaite V, Dementaviciene J, Vilimas A, Kalibatiene D. Association between the posterior part of the circle of Willis and the vertebral artery hypoplasia. PLoS One. 2019 Sep 12;14(9):e0213226.

2. Lochner P, Golaszewski S, Caleri F, Ladurner G, Trinka E. Posterior circulation ischemia in patients with fetal-type circle of Willis and hypoplastic vertebrobasilar system. Neurol Sci. 2011 Dec;32(6):1143-1146.

3. Hsu CF, Chen KW, Su CH, Shen CY, Chi HY. Bilateral Vertebral Artery Hypoplasia and Fetal-Type Variants of the Posterior Cerebral Artery in Acute Ischemic Stroke. Front Neurol. 2021 Apr 8;12:582149.

4. Kulyk C, Voltan C, Simonetto M, Ceccato F, Cagnin A, Manara R. Vertebral artery hypoplasia: an innocent lamb or a disguise? J Neurol. 2018 Oct;265(10):2346-2352.

5. Bakalarz M, Rożniecki JJ, Stasiołek M. Clinical Characteristics of Patients with Vertebral Artery Hypoplasia. Int J Environ Res Public Health. 2022 Jul 29;19(15):9317.

6. Katsanos AH, Kosmidou M, Kyritsis AP, Giannopoulos S. Is vertebral artery hypoplasia a predisposing factor for posterior circulation cerebral ischemic events? Eur Neurol. 2013;70(1-2):78-83.

7. Valenzuela-Fuenzalida JJ, Rojas-Navia CP, Quirós-Clavero AP, Muñoz-Pizarro CE, Arriagada-Lobos L, Méndez-Figueroa C. Anatomy of vertebral artery hypoplasia and its relationship with clinical implications: a systematic review and meta-analysis of prevalence. Surg Radiol Anat. 2024 Jul;46(7):963-975.

8. Thierfelder KM, Baumann AB, Sommer WH, Armbruster M, Opherk C, Janssen H, Reiser MF, Straube A. Vertebral artery hypoplasia: frequency and effect on cerebellar blood flow characteristics. Stroke. 2014 May;45(5):1363-1368.

9. Emmert K, Zöller D, Preti MG, Van De Ville D, Giannakopoulos P, Haller S. Influence of Vascular Variant of the Posterior Cerebral Artery (PCA) on Cerebral Blood Flow, Vascular Response to CO2 and Static Functional Connectivity. PLoS One. 2016 Aug 17;11(8):e0161121.

10. Hsu CF, Chen KW, Su CH, Shen CY, Chi HY. Vertebrobasilar variants and functional implications. Front Neurol. 2021 Apr;12:582149.

MAILING ADDRESS

CECÍLIA LIMA GARCIA
UNIVERSIDADE FEDERAL DE JATAÍ - UFJ
Rod BR 364 km 195 - Setor Parque Industrial n° 3800, Jataí/GO, Brasil
E-mail: cecilialimagarcia@gmail.com

EDITORIAL AND REVIEW

Received: 14/12/25. Accepted: 05/01/26. Published in: 05/02/2026.

CEREM-GOIÁS

Comissão Estadual de Residência Médica de Goiás

ASSOCIAÇÃO GOIANA DE RESIDÊNCIA MÉDICA - AGRM