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Clinical, diagnostic and therapeutic profile of patients with left intraventricular thrombus in three high-complexity centers during the 2000–2022 period

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ABSTRACT

Objective. To determine the clinical, diagnostic, and therapeutic profile of patients with left intraventricular thrombus (LVT) in three high-complexity centers in Medellín, Colombia, between January 2000 and January 2022. **Materials and Methods.** This was an observational, cross-sectional study including 307 patients with LVT. Hospital records were analyzed to identify the clinical and therapeutic profiles, and the resolution of the thrombus and systemic embolism were evaluated. Univariate and bivariate analyses were performed using Fisher's exact test and a logistic regression model. **Results.** The prevalence of LVT was 9.75%. A transthoracic echocardiogram diagnosed 85% of the cases. Men accounted for 75.9% of the patients, with a median age of 62 years. The most frequent comorbidities were heart failure (95.77%) and hypertension (69.7%). LVT occurred in the context of acute coronary syndrome (ACS) in 27% of cases. Low-molecular-weight heparin (LMWH) was administered in 78.5%, and warfarin was the most commonly used anticoagulant (82.7%). Hemorrhagic complications occurred in 19.2% of patients, mainly gastrointestinal, while thrombus resolution was observed in 35%. Systemic embolism developed in 30%, primarily affecting the central nervous system. The mortality rate was 15%. **Conclusions.** The prevalence of LVT was 9.75%. Warfarin remains the standard treatment, although alternative therapies are used in specific cases. Apical dysfunction was associated with systemic embolism.

Keywords: Embolism and Thrombosis; Epidemiology; Anticoagulants; Prognosis (Source: MeSH-NLM).

RESUMEN

Objetivo. Determinar el perfil clínico, diagnóstico y terapéutico de pacientes con trombo intraventricular izquierdo (TVI) en tres centros de alta complejidad en Medellín, Colombia, entre enero de 2000 y enero de 2022. **Materiales y métodos.** Estudio observacional y transversal que incluyó 307 pacientes con TVI. Se analizaron los registros hospitalarios para identificar el perfil clínico y terapéutico, y se evaluó la resolución del trombo y la embolia sistémica. Se realizaron análisis univariado y bivariado con la prueba exacta de Fisher y un modelo de regresión logística. **Resultados.** La prevalencia de TVI fue 9,75%. El 85% de los casos fueron diagnosticados mediante ecocardiograma transtorácico, el 75,9% fueron hombres y la mediana de edad fue 62 años. Las comorbilidades más frecuentes fueron falla cardiaca (95,77%) e hipertensión arterial (69,7%). El 27% de los TVI ocurrieron en el contexto de un síndrome coronario agudo (SCA). La heparina de bajo peso molecular (HBPM) se administró en el 78,5% y la warfarina fue el anticoagulante más común (82,7%). El 19,2% presentó complicaciones hemorrágicas, principalmente gastrointestinales, y el 35% tuvo resolución del trombo. El 30% desarrolló embolia sistémica, principalmente al sistema nervioso central. La mortalidad fue del 15%. **Conclusiones.** La prevalencia de TVI fue del 9,75%. La warfarina sigue siendo el tratamiento estándar, aunque las terapias alternativas se utilizan en casos especiales. La disfunción apical se asoció con embolismo sistémico.

Palabras clave: Embolia y trombosis; Epidemiología; Anticoagulantes; Pronóstico (Fuente: DeCS-Bireme).

Introduction

Left ventricular thrombus (LVT) is a condition associated with systemic embolism, commonly observed in patients with ischemic heart disease, particularly following extensive anterior wall myocardial infarction or delayed revascularization. Risk factors include ST-elevation myocardial infarction (STEMI), high troponin levels, and delayed reperfusion. Pathophysiologically, LVT results from blood stasis, hypercoagulability, and endothelial injury caused by ventricular dysfunction and necrosis. Additionally, it can occur in other cardiomyopathies, such as amyloidosis and eosinophilic myocarditis [1–5].

The use of reperfusion therapies and cardiovascular imaging advancements have reduced LVT incidence by 40% [6–8]. Although the American Heart Association (AHA) published general guidelines in 2022 for the management of LVT after acute coronary syndrome (ACS), evidence regarding optimal pharmacological treatment and clinical follow-up remains limited [9]. In Colombia, information on the prevalence, diagnosis, treatment, and prognosis of patients with LVT is scarce and primarily based on isolated cases. This study aims to describe the clinical and therapeutic profile of patients with LVT and evaluate outcomes regarding thrombus resolution and systemic embolism in a Colombian population with cardiovascular disease.

Materials and Methods

Study Design, population, and sample

This was an observational, descriptive, cross-sectional study involving patients treated in the internal medicine and adult cardiology departments of three high-complexity institutions in Medellín, Colombia. According to the attending physician, participants were selected based on a diagnosis or suspicion of cardiovascular disease that warranted diagnostic imaging studies. The analysis covered medical records from January 2000 to January 2022, focusing on patients diagnosed incidentally or through clinical suspicion of left ventricular thrombus (LVT).

A non-probabilistic convenience sample corresponding to the described cohort was used. Patients aged 18 years or older with a confirmed diagnosis of LVT through echocardiography, cardiac magnetic resonance (CMR), or chest angiotomography were included. Exclusion criteria included patients whose vital status could not be determined six months after diagnosis or whose relevant information, such as echocardiographic or clinical characteristics, was insufficient. Patients with isolated cardiac thrombus in cavities other than the left ventricle were excluded.

Data collection and variable selection

Data were collected using a custom-designed form created through Google Forms. An active search of clinical records, both physical and electronic, from the echocardiography, magnetic resonance, and tomography services was conducted. The search was guided by International Classification of Diseases, 10th Revision (ICD-10) diagnostic codes, including I513 (intracardiac thrombosis, not elsewhere classified), I236 (thrombosis of an artery in the atrium [appendage] and ventricle, complicating acute myocardial infarction), I420 (dilated cardiomyopathy), I255 (ischemic cardiomyopathy), and B57 and B72 (Chagas disease). Information collected by the investigators was entered into an electronic database (Microsoft Excel) and analyzed using the statistical package Epi Info version 1.6.

Variables included age, gender, presence of atrial fibrillation (AF), and chronic kidney disease. The etiology and corresponding functional class were specified for patients with heart failure (HF). Additionally, cases associated with acute coronary events were identified, as well as whether the patients underwent revascularization and the time elapsed for its execution. Diagnostic methods were evaluated, and key variables, such as size, mobility, and affected territories, were analyzed. Finally, the chosen treatment, the primary reasons for its selection, and associated complications were documented.

Statistical Analysis and Outcomes

The sociodemographic and clinical characterization of patients was conducted using univariate analysis. Absolute and relative frequencies were determined for qualitative variables, while quantitative variables were assessed using the Shapiro-Wilk test, revealing a non-parametric distribution. Consequently, the analysis employed median and interquartile range (IQR) as central tendency and dispersion measures.

The frequency analysis of potential factors associated with the development of LVT was performed using chi-square and Fisher's exact tests. To analyze patient outcomes in terms of systemic embolism and thrombus resolution (dependent variables), a group of independent variables with biological plausibility for these outcomes was selected. A logistic regression model was applied to establish potential associations, calculating both crude and adjusted odds ratios (ORs). Statistical significance was defined as a p-value <0.05.

Ethical Considerations

The study was conducted in accordance with the criteria outlined in Article 11 of Resolution 8430 of 1993. Ethical approval was obtained from the ethics and research committees of the Hospital Universitario San Vicente Fundación (HUSVF), Clínica Cardio VID, and Hospital Pablo Tobón Uribe in Medellín.

Results

Table 1 presents the sociodemographic characteristics of the patients included in the study. 75.9% of the patients were male, with a median age of 62 years. HF (95.8%) was the most frequent comorbidity, followed by hypertension (69.7%). A total of 21 patients had a history of cancer, with hematological malignancies being the most common (38%), followed by gastrointestinal tract carcinomas (14%). Genitourinary tract cancers, including bladder and prostate cancer in men, were also diagnosed in 14% of the cases. Other types of cancer include skin, breast, and lung.

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More than 70% of the patients had ischemic HF as the etiology, followed by "other etiologies" (including arrhythmia-induced, eosinophilic, toxic, peripartum, and Takotsubo cardiomyopathies) at 8.8%, idiopathic dilated cardiomyopathy at 7.5%, and valvular or hypertensive cardiomyopathies, each at less than 5%. Regarding functional classification, more than 50% of the patients were classified as NYHA II (41%) and III (38%).

27% of LVT cases were diagnosed in the context of ACS, with more than 80% of these being acute myocardial infarctions (with or without ST-segment elevation). 87% of the patients underwent coronary revascularization therapy, and more than half received late primary percutaneous coronary intervention (PCI) over 12 hours after the index event. The most commonly affected vessel was the left anterior descending artery (16%), followed by multivessel disease (6.1%).

The diagnosis of LVT was primarily made using transthoracic echocardiography (TTE), accounting for 85% of cases, followed by contrast-enhanced CMR at 8%, transesophageal echocardiography (TOE) at 6%, and chest computed tomography at 1%. Since 2013, CMR has been introduced as a diagnostic method, with a significant increase in cases detected using this modality in 2019 and 2021, with six cases per year. The primary indications for TOE as an initial diagnostic method included cerebrovascular disease evaluation, suspected endocarditis, and left atrial appendage closure, among others. Echocardiographic findings are detailed in **Table 2**. 4.8% of thrombi were also located in other cardiac chambers, primarily the right ventricle, followed by the left atrium and, less frequently, the right atrium.

Approximately 78% of patients received in-hospital treatment with low-molecular-weight heparins (LMWH). For outpatient treatment, warfarin was the drug of choice in more than 80% of cases. The main reasons for choosing direct oral anticoagulants (DOACs) or LMWH in outpatients were clinician-assessed bleeding risk, social conditions, or inadequate follow-up feasibility. 19% of the patients experienced hemorrhagic complications during anticoagulant treatment, with most occurring in the gastrointestinal tract or central nervous system. 42% of these

Table 1. Sociodemographic characteristics of patients diagnosed with LVT

	N	%
Patients with LVT	307	100
Age (years), Me (IQR)	62 (52–72)	
Gender		
Female	74	24.1
Male	233	75.9
Medical history		
Heart failure	294	95.8
HTN	214	69.7
Coronary artery disease	139	45.3
T2DM	97	31.6
CKD	56	18.2
CVD	41	13.3
AF	32	10.4
Hypothyroidism	26	8.5
Arrhythmias (other than AF)	24	7.8
Cancer	21	6.8
HIV	5	1.6
Habits		
Smoking	111	36.1
Alcohol consumption	33	10.7

Me: median; IQR: interquartile range; HTN: hypertension; T2DM: Type 2 Diabetes Mellitus; CKD: chronic kidney disease; CVD: cerebrovascular disease; AF: atrial fibrillation; HIV: human immunodeficiency virus.

Table 2. Echocardiographic findings and LVT characteristics

	N	%
Echocardiographic findings		
LVEF (%), Me (IQR)	30 (20–37)	
Left ventricular diastolic diameter (cm), Me (IQR)	5.4 (4.6–6.1)	
End-diastolic volume (mL), Me (IQR)	125 (79–177)	
Left atrial area (4 chambers) (cm^2), Me (IQR)	21 (17–26)	
Indexed left atrial volume (mL/m^2), Me (IQR)	40 (30–53)	
Ventricular aneurysm	77	25.1
Contractility disorder	288	93.8
Affected wall		
Apex	167	54.4
Anterior	134	43.6
Inferior	82	26.7
Diffuse	64	20.8
Septal/Lateral	60	19.5
Atrial dilation*	202	65.8
Spontaneous contrast	42	13.6
Valvular disease	225	73.3
Mild	129	42
Moderate	70	22.8
Severe	24	7.8
ND	2	0.6
Thrombus characteristics		
Attached	222	72.3
Mobile	85	27.7
Thrombus size (mm), Me (IQR)	17 (11–22)	

LVEF: left ventricular ejection fraction; Me: median; IQR: interquartile range; ND: Not determined.
*Atrial dilation is defined as an indexed volume > 34 mL/m^2.

cases required transfusion therapy **(Table S1, Supplementary Material)**.

54% of LVT patients underwent imaging follow-up; 48.5% were conducted using TTE, followed by CMR (3.5%) and TOE (1.6%). Among patients with follow-up imaging, 35% experienced thrombus resolution, while 45% had indeterminate outcomes due to follow-up interruption, institutional changes, or unknown conditions. According to the records, in-hospital mortality was 8.5%, while follow-up mortality was 6% **(Table S2, Supplementary Material)**.

Table 3 presents the factors associated with thrombus resolution. Regarding outpatient treatment, most patients who experienced thrombus resolution (80.6%) received warfarin.

Approximately 30% of patients with LVT developed systemic embolism, most commonly affecting the central nervous system **(Table S2, Supplementary Material)**. The median thrombus size was smaller in patients who experienced embolism than those who did not (16.5 mm vs. 18 mm). Left ventricular ejection fraction (LVEF) did not show statistically significant differences. Additionally, in patients without embolism, spontaneous contrast was more frequent (p = 0.016) **(Table 4)**. Apical contractility disorders were more common in patients with embolism (59.7%). Patients with coronary artery disease experienced systemic embolism less frequently. Anterior descending artery involvement and multivessel disease were more frequent in patients who did not develop systemic embolism, with statistically significant differences (p = 0.001 and p = 0.032, respectively) **(Table 4)**.

A history of AF, an LVEF of less than 30%, and outpatient treatment with warfarin were more frequently associated with thrombus resolution, although no statistically significant differences were observed **(Table 5)**. A history of AF, mobile thrombi, apical contractility disorders, and in-hospital LMWH use were associated with a higher frequency of systemic embolism. However, only apical akinesia showed statistically significant differences (OR = 1.89, 95% CI: 1.11–3.20). Conversely, a history of ACS was associated with a lower frequency of systemic embolism (OR = 0.13, 95% CI: 0.06–0.19) **(Table 6)**.

Table 3. Bivariate analysis: thrombus resolution by comorbidities and treatment

	Thrombus resolution		p-value*
	Yes N = 108	No N = 58	
Heart failure	101 (93.5%)	58 (100.0%)	0.097
Atrial fibrillation	12 (11.1%)	7 (12.07%)	0.853
ACS	32 (29.6%)	21 (36.21%)	0.386
In-hospital treatment			
Low-molecular-weight heparin	83 (76.8%)	46 (79.31%)	0.716
Unfractionated heparin	18 (16.6%)	7 (12.07%)	0.5
DOAC	2 (1.8%)	2 (3.45%)	0.613
Outpatient treatment			
Warfarin	87 (80.5%)	40 (68.97%)	0.093
Low-molecular-weight heparin	7 (6.4%)	6 (10.34%)	0.38
DOAC	8 (7.4%)	6 (10.34%)	0.563

ACS: acute coronary syndrome; DOAC: direct oral anticoagulant.
*p < 0.05 is considered statistically significant.

Table 4. Bivariate analysis: embolism by LVT and echocardiographic characteristics

	Embolism (N = 92)	No Embolism (N = 215)	p-value*
Thrombus characteristics			
Attached	62 (67.3%)	160 (74.4%)	0.207
Mobile	30 (32.6%)	55 (25.5%)	0.153
Thrombus size, Me (IQR) (mm)	16.5 (9.5–22.5)	18.0 (12.0–22.0)	0.218
Thrombi in other cavities	3 (2.2%)	12 (5.5%)	0.585
Echocardiographic findings			
LVEF (%), Me (IQR)	30 (20–40)	29 (20–35)	0.133
LV diastolic diameter (cm), Me (IQR)	4.5 (4.5–6.5)	5.3 (4.6–6.1)	0.374
LV end-diastolic volume (mL), Me (IQR)	97 (58–178)	130 (89–175)	0.085
Left atrial area (4 chambers) (cm^2), Me (IQR)	22 (18–25)	21 (17–26)	0.294
Indexed left atrial volume (mL/m^2), Me (IQR)	40 (29–52)	40 (30–53)	0.837
Ventricular aneurysm	21 (22.8%)	56 (26.0%)	0.58
Contractility disorder	88 (95.6%)	200 (93.0%)	0.449
Atrial dilation	59 (64.1%)	143 (66.5%)	0.687
Spontaneous contrast	6 (6.5%)	36 (16.7%)	0.016
Affected Wall			
Apex	55 (59.7%)	112 (52.0%)	0.215
Anterior	39 (42.3%)	95 (44.1%)	0.771
Inferior	25 (27.1%)	57 (26.5%)	0.904
Diffuse	15 (16.3%)	49 (22.7%)	0.199
Septal/Lateral	16 (17.3%)	44 (20.4%)	0.533
Affected vessel			
Left anterior descending artery	4 (4.3%)	48 (22.3%)	<0.001
Multivessel disease	0 (0.0%)	19 (8.8%)	0.003
Circumflex artery	0 (0.0%)	8 (3.7%)	0.061
Right coronary artery	1 (1.0%)	5 (2.3%)	0.672
Left main artery	0 (0.0%)	4 (1.8%)	0.312

LVT: left ventricular thrombus; LVEF: left ventricular ejection fraction; LV: left ventricle; Me: median; IQR: interquartile range.
*p < 0.05 is statistically significant.

Table 5. Crude and adjusted logistic regression association of selected factors with thrombus resolution

	Crude OR	95% CI	adjusted OR	95% CI
Medical history				
Heart failure	NC	NC	NC	NC
AF	0.91	0.31 – 2.91	1.03	0.37 – 2.90
ACS	0.74	0.36 – 1.55	0.74	0.36 – 1.49
LVEF < 30%	1.11	0.56 – 2.21	1.12	0.58 – 2.17
Treatment				
In-hospital LMWH	0.87	0.36 – 1.99	0.71	0.30 – 1.64
Outpatient warfarin use	1.86	0.83 – 4.12	2.22	0.99 – 4.93

NC: not calculated; LMWH: Low-molecular-weight heparin; ACS: acute coronary syndrome; AF: atrial fibrillation; LVEF: left ventricular ejection fraction; OR: odds ratio; CI: confidence interval.

Discussion

In this study, the prevalence of LVT in a population with cardiovascular disease was 9.7%. The most frequent comorbidities identified were HF, hypertension, and coronary artery disease. Although alternative therapies have been introduced, warfarin remains one of the treatments of choice. Apical contractility disorder was found to be associated with a higher risk of systemic thromboembolism. Additionally, the use of warfarin showed a significant trend toward favoring thrombus resolution, while a history of ACS was linked to a lower incidence of systemic embolism.

Most studies evaluate the prevalence of intracavitary thrombi in specific cardiovascular conditions, such as HF or ischemic heart disease. The reported prevalence of LVT is 2.4% in a series of patients whose cardiovascular disease diagnosis was established through autopsy [10]. In patients with ischemic heart disease, this prevalence can range from 5% to 15%, while in HF, it can reach up to 44% [10]. Furthermore, there is a stronger association between LVT and patients with HF and a LVEF below 30% [11].

Comorbidities and cardiovascular risk factors similar to those described in patients with cardiovascular conditions were identified. Regarding cases with a history of cancer (21 patients, equivalent to 6.8%), a lower frequency was observed compared to other published cohorts, such as that of Lemaitre *et al.*, where the estimate was 11% [12]. However, the available information on this topic is limited, and detailed descriptions of cancer types are primarily found in case reports or case series [13-15]. Factors in this group of patients that may contribute to thrombus development include hypercoagulability, chemotherapy, the use of central venous catheters, and prolonged immobility, which can be extrapolated to all types of malignancies.

As an imaging method for detecting LVT, TTE stands out, having been used in 85% of the sample [16–19]. Given its wide availability in cardiology services, TTE remains the most commonly used strategy for identifying intraventricular thrombi. However, CMR may be more appropriate in cases of suspected LVT when echocardiographic results are negative, but there is high clinical suspicion, such as in cardioembolic cerebrovascular disease [9].

Before the adoption of coronary reperfusion therapies in 1995 and the widespread use of antiplatelet and anticoagulant drugs, the prevalence of LVT in patients presenting with ACS could reach up to 46% [20]. Currently, early in the course of ACS, prevalence data range between 2.9% and 15% [21]. In this study, the prevalence of LVT diagnosed in the context of ACS was 27%, higher than reported in various studies of patients with acute ischemic heart disease. This can be explained by including patients who received early reperfusion therapy and those who underwent delayed primary PCI. More than half of the subjects in this study underwent invasive stratification more than 12 hours after the index event, which may have contributed to the high frequency of thrombus detection.

Table 6. Crude and adjusted logistic regression association of selected factors with the development of embolism

	Crude OR	95% CI	adjusted OR	95% CI
Age ≥ 60 years	1.06	0.66 – 1.79	0.84	0.48 – 1.48
Comorbidities				
AF	1.96	0.86 – 4.40	1.95	0.87 – 4.39
ACS	0.15	0.06 – 0.35	0.13	0.06 – 0.19
Echocardiographic Findings				
Aneurysm	0.84	0.45 – 1.54	0.81	0.42 – 1.60
Mobile	1.41	0.79 – 2.47	1.31	0.73 – 2.34
Thrombus size ≥ 17 mm	0.79	0.47 – 1.33	0.81	0.48 – 1.39
LVEF ≤ 30%	0.85	0.51 – 1.44	0.73	0.41 – 1.28
Affected apex	1.37	0.81 – 2.32	1.89	1.11 – 3.20
Affected Vessel				
Left anterior descending artery	0.16	0.04 – 0.45	0.18	0.04 – 0.90
Treatment				
In-hospital LMWH	1.3	0.68 – 2.57	1.72	0.90 – 3.31
Outpatient warfarin use	0.76	0.44 – 1.35	0.74	0.41 – 1.36

AF: atrial fibrillation; ACS: acute coronary syndrome; LVEF: left ventricular ejection fraction; LMWH: low-molecular-weight heparin; OR: odds ratio; CI: confidence interval.
*p < 0.05 is considered statistically significant.

Independent of the reperfusion strategy, it has been demonstrated that the involvement of the left anterior descending artery is associated with the development of LVT. According to the series analyzed, the frequency of anterior wall myocardial infarction in patients with intraventricular thrombus can reach up to 94% [11]. Additionally, a meta-analysis including over 10,000 patients undergoing PCI found that the risk of developing LVT was 9.1% in patients with anterior STEMI, compared to 2.7% in patients with infarctions in other regions [22]. HF was the cardiovascular condition most frequently associated with LVT in 95% of cases. Physiopathologically, HF is recognized as a predisposing factor for intracavitary thrombus formation, even in sinus rhythm. This finding aligns with the current study, as only 10% of patients had a concomitant diagnosis of AF [2].

Limited evidence suggests that anticoagulant therapy significantly impacts thrombus resolution or reduces embolism risk [9]. In addition to anticoagulation, proper management of the patient's comorbidities, particularly HF, is essential. Most patients received anticoagulant therapy in this series, yet only 35.1% achieved thrombus resolution. When comparing this result with other series reporting LVT resolution rates above 50% and even up to 98% [10, 23], it highlights the need to implement better follow-up strategies, as more than 40% of the sample lacked clinical monitoring.

The majority of patients received outpatient anticoagulation therapy with warfarin (82.7%). Results from both bivariate analysis and the regression model indicated that patients treated with this medication had a higher frequency of LVT resolution (OR = 2.2; 95% CI: 0.99–4.93). Similar findings have been observed in clinical trials evaluating the effectiveness of warfarin compared to no treatment or antiplatelet therapy, with effectiveness rates of up to 60% ($p < 0.01$) [9].

Due to the challenges some patients face in maintaining the therapeutic range with warfarin, current evidence supports the use of DOACs in managing patients with LVT. The American Heart Association/American Stroke Association (AHA/ASA) guidelines for stroke management provide a Class IIb recommendation for using DOACs or warfarin in the treatment of LVT based on two retrospective studies [24]. The most recent evidence, derived from a systematic review and meta-analysis including 12 studies with 2,322 LVT patients, found these two strategies comparable in therapeutic efficacy and safety [25].

The systemic embolism outcome in this study was approximately 30%, a figure higher than reported in other series. This may be related to the prolonged follow-up period of the patients, as studies with median follow-ups shorter than 12 months have reported nearly zero embolism frequency. In contrast, cohorts with up to three years of follow-ups have recorded annual embolism rates as high as 3.7% [26].

Mobile thrombi have long been recognized as a risk factor for systemic embolism [27]. Apical contractility disorder was more frequently and statistically significantly associated with systemic embolism in our study. This finding could be interpreted in light of the higher prevalence of LVT formation in anterior wall infarctions, which cause more extensive myocardial damage and, consequently, a greater likelihood of embolism, particularly in patients with apical hypokinesia or akinesia. However, this finding requires confirmation with additional cohorts, as various individual embolism predictors (such as LVT size, hyperkinesia of adjacent segments, and morphological changes, among others) identified in individual studies have yet to be confirmed in larger populations [28]. Other factors, such as thrombus size and echocardiographic characteristics like LVEF or ventricular aneurysms, did not significantly impact embolic outcomes in this sample.

Among the factors associated with a lower frequency of embolism, it is noteworthy that a history of ACS was linked to a lower incidence of embolism. This finding contradicts previous reports, which indicate that patients developing LVT after ACS have a 5.5 times higher likelihood of experiencing embolic events [9,29]. One possible explanation for this finding in our study could be the use of additional interventions (e.g., antiplatelets) that might have mitigated the clinical outcome. An appropriate strategy would be to characterize a sample limited to patients with coronary artery disease and/or ACS and further categorize them based on the time to coronary reperfusion. It is known that the duration of ischemia impacts the formation of intraventricular thrombi and cardiac remodeling processes. Similarly, it is important to consider the presence of spontaneous echocardiographic contrast or "smoke" echocardiography, a rare finding reported in low-flow states or turbulent ventricular flow through stenotic mitral valves. This phenomenon was identified more frequently in patients who did not develop embolism (p=0.01). However, although it has been considered a potential source of embolic material, it has not been definitively demonstrated in the available scientific evidence [30]. Mortality during hospitalization and follow-up was observed to be 15.5%, a figure similar to that reported in other populations, where these rates reach up to 12% [28]. It is important to note that hemorrhagic complications in this sample did not exceed 20%.

This study has several limitations. As an observational registry based solely on clinical records, follow-up information is limited, partly explaining the high percentage of data loss regarding thrombus resolution and follow-up, which may introduce potential information biases. Additionally, using a convenience sample limits the generalizability of the results. Furthermore, due to the study's nature, numerous unmeasured (confounding) variables, although considered in the analysis, could influence the interpretation of the findings.

In conclusion, the prevalence of LVT in a Colombian population with cardiovascular disease was 9.75%. The most common comorbidities were ischemic HF, hypertension, and coronary artery disease. Warfarin remains a cornerstone treatment, although alternative therapies are used in some cases. Apical contractility disorder was associated with a higher risk of systemic thromboembolism, while a history of ACS was linked to a lower frequency of systemic embolism.

Author Contributions

FLP, CCB: conceptualization, investigation, writing - original draft, writing - review & editing. **CCB, JDVD, EAMG, JNDF:** investigation, writing - original draft, writing - review & editing. **JMS, EMO, JAGR, SGR, CGM:** methodology, writing - review & editing.

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