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Administration Office

Şair Eşref Bulvarı, 1402 Sk. No: 2/2 Özbaş Apt.
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Phone: + 90 232 464 19 63 / **Fax:** +90 232 464 24 70

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Conduit Choice for Coronary Artery Bypass Grafting in Women

AlleaBelle Bradshaw, Jennifer S. Lawton

Johns Hopkins University Faculty of Medicine, Department of Surgery, Division of Cardiac Surgery, Maryland, USA

Keywords: Bypass, cardiovascular surgery, coronary artery disease

Introduction

Although women have a similar incidence of coronary artery disease compared with men, they undergo fewer coronary artery bypass grafting (CABG) procedures and experience worse operative outcomes[1-3]. Several factors may contribute to the disparity in outcomes: women are older at presentation, present with more advanced disease, exhibit atypical symptoms, and have a higher burden of comorbidities. Women also have anatomical and physiologic differences, such as smaller coronary artery diameters, which may influence surgical technique and graft patency.

Despite these differences, most data regarding CABG outcomes have been derived from predominantly male populations. For example, a recent study of 1 million CABG patients found that only 16% were women[4]. This underrepresentation limits generalizability, raising concerns about directly extrapolating results from male-dominated studies to the care of women. The ROMA: Women trial (NCT041244120) is now underway, randomizing women to multiple arterial grafting (MAG) or single arterial grafting[5]. As the first all-female randomized trial in cardiac surgery, this study will provide much-needed data to guide conduit choice in women.

Until then, choice of conduit for women must rely on careful interpretation of existing evidence and should acknowledge sex-specific anatomical and clinical considerations. In this editorial, we summarize current data and provide recommendations for the use of conduits in women. At present, conduit selection for women should follow the same algorithm for men (Figure 1),[6] with MAG prioritized when feasible, while we await sex-specific evidence from ROMA: Women.

Left Internal Mammary Artery

The left internal mammary artery (LIMA) remains the gold standard conduit for the left anterior descending

Address for Correspondence: Jennifer S. Lawton, Johns Hopkins University Faculty of Medicine, Department of Surgery, Division of Cardiac Surgery, Maryland, USA
e-mail: jlawton4@jhmi.edu **ORCID:** orcid.org/0000-0002-3282-0025
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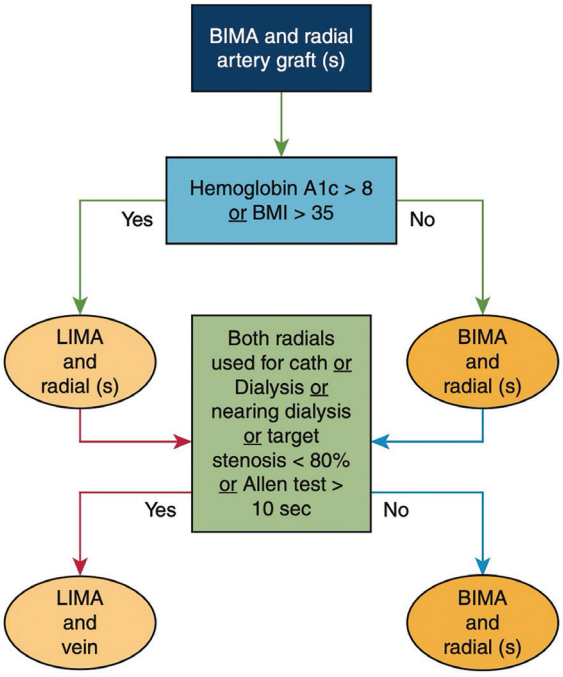

Figure 1. Algorithm for conduit planning in patients undergoing coronary artery bypass grafting
In men and women undergoing coronary artery bypass grafting, multiple arterial grafting is prioritized unless contraindications are present[6]. Figure re-used with permission from Elsevier (license: 6118980552380, obtained 30.09.2025)

BIMA: Bilateral internal mammary arteries, BMI: Body mass index, LIMA: Left internal mammary artery

artery; its use during CABG is recommended as a Class 1 recommendation in current ACC/AHA/SCAI Guidelines; and it is a Society of Thoracic Surgeons quality metric that affects national, publicly available quality metrics[7]. Despite its established benefits, women are less likely than men to receive a LIMA graft[8]. Reasons for non-use differ by sex. Among men, emergency status and prior cardiac surgery are more common explanations. In women, prior mediastinal radiation, subclavian stenosis, and inadequate size or flow were more frequently cited to defend non-LIMA use. Rarely, patients may have had prior breast reconstruction, thereby precluding LIMA use[9]. Given its proven survival advantage, LIMA use should remain routine in women, with rare exceptions (left subclavian stenosis, previous cardiac or thoracic surgery, previous mediastinal radiation, emergent or salvage procedures, absence of bypassable left anterior descending coronary artery disease).

Radial Artery

Current guidelines recommend the radial artery as the preferred conduit for the second-most important coronary-artery target[7]. Evidence shows that women derive the same benefit from radial artery grafting as men do[10,11]. Accordingly, sex alone should not influence the decision to use the radial artery. Contraindications include prior catheterization of both radial arteries, existing or potential hemodialysis access, target vessel stenosis <80%, or inadequate ulnar compensation on the Allen test. Whenever feasible, the radial artery should be used in women as the second-choice conduit.

Bilateral Internal Mammary Arteries

The use of bilateral internal mammary artery (BIMA) grafting is less common in women than in men[12]. A major concern is the increased risk of deep sternal wound infection (DSWI) associated with BIMA, and female sex itself is an independent risk factor for DSWI[13]. As a result, the benefit of BIMA among women has been questioned. Randomized data will be critical in clarifying its role, but based on current evidence, female sex alone should not be considered a contraindication. In women without significant obesity or diabetes –and particularly when the radial artery is unavailable –BIMA remains a reasonable and valuable option. With careful patient selection and surgical technique, BIMA can and should be offered.

Saphenous Vein

Women are more likely than men to undergo CABG with saphenous vein grafts (SVG)[14]. However, SVGs have inferior long-term patency compared with arterial conduits; failure rates are significantly higher at one year than those of the radial artery[15]. Despite these limitations, SVGs remain an essential component of CABG, particularly when arterial conduits are contraindicated or unavailable. Optimal technical strategies (no-touch harvesting) and medical therapy (antiplatelet agents and statins) improve graft durability. Although SVGs should be considered a last resort after arterial options, they remain indispensable in women when arterial conduits are not feasible.

Multiple-arterial Grafting

Current evidence suggests that women derive important benefits from MAG, including improved survival[10] and greater freedom from major adverse cardiac and cerebrovascular events[16]. Despite these advantages, data from large registries demonstrate that women are less likely than men to receive any arterial graft and to undergo complete revascularization[8]. Some of this disparity may be explained by differences in baseline patient factors,[12] but it also reflects ongoing variability in surgical practice. Given consistent benefits reported in current evidence, MAG should be prioritized in women to the same extent as it is in men.

Summary

Conduit selection should be individualized, accounting for patient-specific factors. Overall, the algorithm for women mirrors that for men, with MAG prioritized. Randomized data will be pivotal for providing sex-specific evidence and may help reduce disparities in CABG outcomes between women and men.

Footnotes

Authorship Contributions

Surgical and Medical Practices: Bradshaw AB, Lawton JS, Concept: Bradshaw AB, Lawton JS, Design: Bradshaw AB, Lawton JS, Data Collection and/or Processing: Bradshaw AB, Lawton JS, Analysis and/or Interpretation: Bradshaw AB, Lawton JS, Literature Search: Bradshaw AB, Lawton JS, Writing: Bradshaw AB, Lawton JS.

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References

1. Briscoe JB, Lawton JS. Improving coronary artery bypass grafting in women: difficulties and outcomes. J Updates Cardiovasc Med. 2025;13:8-16.
2. Gaudino M, Alexander JH, Egorova N, et al. Sex-related differences in outcomes after coronary artery bypass surgery—a patient-level pooled analysis of randomized controlled trials: rationale and study protocol. J Card Surg. 2020;35:2754-8.
3. Angraal S, Khera R, Wang Y, et al. Sex and race differences in the utilization and outcomes of coronary artery bypass grafting among medicare beneficiaries, 1999-2014. J Am Heart Assoc. 2018;7.
4. Sabik JF, Mehaffey JH, Badhwar V, et al. Multiarterial vs single-arterial coronary surgery: 10-year follow-up of 1 million patients. Ann Thorac Surg. 2024;117:780-8.
5. Gaudino M, Bairey Merz CN, Sandner S, et al. Randomized comparison of the outcome of single versus multiple arterial grafts trial (ROMA):women—a trial dedicated to women to improve coronary bypass outcomes. J Thorac Cardiovasc Surg. 2024;167:s1316-21.
6. Lawton JS. Commentary: one artery does not fit all: tailoring the operation to the patient. JTCVS Open. Elsevier Inc. 2021;5:70-1.
7. Lawton JS, Tamis-Holland JE, Bangalore S, et al. 2021 ACC/AHA/SCAI guideline for coronary artery revascularization: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. J Am Coll Cardiol. 2022;79:e21-e9
8. Jawitz OK, Lawton JS, Thibault D, et al. Sex differences in coronary artery bypass grafting techniques: a society of thoracic surgeons database analysis. Ann Thorac Surg. 2022;113:1979-88.
9. Bradshaw A, Briscoe JB, Bradshaw JC, et al. Coronary artery bypass grafting after deep inferior epigastric perforator flap breast reconstruction: a case report. JTCVS Tech. 2025;33:146-51.
10. Robinson NB, Lia H, Rahouma M, et al. Coronary artery bypass with single versus multiple arterial grafts in women: a meta-analysis. J Thorac Cardiovasc Surg. 2023;165:1093-8.
11. Gaudino M, Benedetto U, Fremes S, et al. Association of radial artery graft vs saphenous vein graft with long-term cardiovascular outcomes among patients undergoing coronary artery bypass grafting: a systematic review and meta-analysis. JAMA. 2020;324:179-87.
12. Jabagi H, Tran DT, Hessian R, et al. Impact of gender on arterial revascularization strategies for coronary artery bypass grafting. Ann Thorac Surg. 2018;105:62-8.
13. Schwann TA, Gaudino MFL, Engelman DT, et al. Effect of skeletonization of bilateral internal thoracic arteries on deep sternal wound infections. Ann Thorac Surg. 2021;111:600-6.
14. Attia T, Koch CG, Houghtaling PL, et al. Does a similar procedure result in similar survival for women and men undergoing isolated coronary artery bypass grafting? J Thorac Cardiovasc Surg. 2017;153:571-579.e9.
15. Gaudino M, Sandner S, An KR, et al. Graft failure after coronary artery bypass grafting and its association with patient characteristics and clinical events: a pooled individual patient data analysis of clinical trials with imaging follow-up. Circulation. 2023;148:1305-15.
16. Tam DY, Rocha RV, Fang J, et al. Multiple arterial coronary bypass grafting is associated with greater survival in women. Heart. 2021;107:888-94.

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Mid-term Outcomes of a Stent-free PMT-CDT Strategy for Acute Iliofemoral Deep Vein Thrombosis

Emced Khalil

Trabzon Ahi Evren Thoracic and Cardiovascular Surgery Training and Research Hospital, Clinic of Cardiovascular Surgery, Trabzon, Türkiye

Abstract

Objectives: Acute iliofemoral deep vein thrombosis (DVT) is distinguished by a pronounced symptomatology and an increased risk of post-thrombotic syndrome. Various techniques of prompt thrombus removal are intended to improve venous patency and outcomes; however, controversy still surrounds the appropriate modality of endovascular treatment and the necessity of routine stenting. In this study, we aimed to evaluate the procedural safety, efficacy, and intermediate-term outcomes of a standard stent-free pharmacomechanical thrombectomy with catheter-directed thrombolysis (PMT-CDT) in acute iliofemoral DVT.

Materials and Methods: This was a retrospective single-center study of 50 consecutive patients undergoing treatment for acute iliofemoral DVT between January 2020 and December 2023. All patients underwent a standardized endovascular treatment protocol using PMT and low-dose CDT without the routine use of venous stenting. Technical success, periprocedural complications, and re-thrombosis were evaluated. Estimation of re-thrombosis-free survival was performed using Kaplan-Meier survival analysis at 3, 6, and 12 months.

Results: Technical success was obtained in 46 patients (92%). There were no deaths, pulmonary embolism, and major hemorrhage. Minor complications occurred in five patients (10%) and were managed conservatively. During the period of follow-up, five patients (10%) were lost to follow-up. Kaplan-Meier estimates showed that the probability of freedom from re-thrombosis at 3 months, 6 months, and 12 months was 97.5%, 92.5%, and 87.5%, respectively. Venous stent insertion was not necessary in any patient after thrombus clearance based on venographic assessment.

Address for Correspondence: Emced Khalil, Trabzon Ahi Evren Thoracic and Cardiovascular Surgery Training and Research Hospital, Clinic of Cardiovascular Surgery, Trabzon, Türkiye
e-mail: emjedkhalil@gmail.com **ORCID:** orcid.org/0000-0002-9814-7056
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Conclusion: In this study, a standard stent-free PMT-CDT approach was shown to be a feasible and safe option for selected patients with acute iliofemoral DVT, with good mid-term patency results. However, these results should be interpreted with caution, as this study was descriptive in nature, without any standard evaluation of outcome, such as post-thrombotic syndrome scoring. Further prospective studies are needed to clarify the role of stent-free techniques in managing acute iliofemoral DVT.

Keywords: Acute iliofemoral deep vein thrombosis, pharmacomechanical thrombectomy, catheter-directed thrombolysis, venous patency, stent-free endovascular strategy, venous thromboembolism

Introduction

Acute iliofemoral deep vein thrombosis (DVT) is considered one of the worst forms of venous thromboembolism, often resulting in significant morbidity, including limb edema, pain, and compromised venous outflow. Compared with DVT in the more distal veins, iliofemoral DVT tends to have a larger thrombus burden and a higher risk of long-term complications, including post-thrombotic syndrome (PTS)[1-3]. The development of PTS can result in chronic venous insufficiency, including venous hypertension, skin changes, and venous ulcers, thereby significantly impairing the quality of life and functional status of the patient[2,3]. Anticoagulation remains the mainstay of treatment for acute DVT, aiming to inhibit thrombus propagation and prevent pulmonary embolism. However, these agents are ineffective in thrombus dissolution and are often ineffective in the setting of extensive proximal thrombosis[4]. The presence of thrombus and compromised venous outflow are major factors in the development of PTS[1,5]. Therefore, thrombus removal techniques have been proposed as a means of hastening thrombus dissolution and restoration of venous outflow. Endovascular thrombus removal techniques, including catheter-directed thrombolysis (CDT) and pharmacomechanical thrombectomy (PMT), have been increasingly used in the treatment of acute iliofemoral DVT in carefully selected patients[6,7]. These modalities have the theoretical advantage of reducing thrombus burden while minimizing the use of thrombolytic agents. These modalities have been reported to result in improved early venous patency and symptom relief; however, the effect on long-term clinical outcomes remains a matter of ongoing debate[1,2,7]. The ATTRACT study also assessed the development of PTS using standardized clinical scoring systems and emphasized the difficulty in demonstrating clinical benefit from these endovascular modalities[1,2].

A further debated issue in the endovascular treatment of DVT is the role of venous stenting following thrombectomy. Although the placement of a stent can be beneficial for patients with fixed iliac vein obstruction or significant residual stenosis, the routine use of stenting remains a debated issue, and the use of an anatomy-based selective stenting approach has been advocated[8]. The PMT-CDT method is a hybrid endovascular treatment that combines the benefits of thrombectomy with the benefits of CDT, potentially improving thrombus removal while limiting the thrombolytic agent used and the time required for thrombolytic therapy when compared with CDT alone[6,7]. However, there is a lack of data supporting the use of standardized endovascular treatment protocols without stenting, and data on the mid-term results of such treatment are also lacking.

This study aimed to evaluate the mid-term results of a standardized, stent-free PMT-CDT method for the endovascular treatment of acute iliofemoral DVT.

Materials and Methods

Study Design and Patient Population

This retrospective study included consecutive adult patients treated for acute iliofemoral DVT at the

Trabzon Ahi Evren Thoracic and Cardiovascular Surgery Training and Research Hospital between January 2020 and December 2023. Acute DVT was defined as a DVT presenting for less than 14 days. The inclusion criteria for the study were patients aged 18 years and above presenting with imaging-confirmed acute iliofemoral DVT involving the common iliac, external iliac, and femoral veins. Exclusion criteria included patients who presented with contraindications to thrombolytic therapy, active bleeding, bleeding diathesis, pregnancy, isolated distal DVT without iliofemoral involvement, chronic and subacute thrombosis, and incomplete clinical and imaging data. Ethical approval for the study was obtained from the Ordu University Clinical Research Ethics Committee (approval no: 2020/225; date: 27.10.2020). Informed consent was not required for this retrospective study.

Endovascular Procedure

These were performed under local anesthesia in accordance with a standardized endovascular protocol. A temporary retrievable inferior vena cava (IVC) filter was placed pre-procedure according to institutional protocol, given the extensive thrombus burden and potential for embolization during pharmacomechanical manipulation. Venous access was achieved through the popliteal vein under ultrasound guidance. PMT-CDT was performed using a rotational thrombectomy device.

Alteplase was administered as an initial bolus of 5-10 mg via the thrombectomy catheter, followed by a continuous catheter-directed infusion at 0.5-1.0 mg/h, depending on thrombus burden and clinical response. The thrombolysis was continued for 12-24 hours, followed by venography to evaluate thrombus clearance.

An anatomic evaluation of the iliac venous segment was carried out using completion venography after thrombus removal. The extent of residual venous stenosis was evaluated visually and was considered significant when luminal narrowing of more than 30% was associated with impaired contrast flow or evidence of collateral circulation. Intravascular ultrasound was not routinely available during our study period and, hence, was not used to evaluate underlying iliac vein compression.

Balloon venoplasty was performed for residual venous stenosis. Venous stenting was not included in our protocol.

Postprocedural Management and Follow-up

Subsequent anticoagulant therapy was initiated with low-molecular-weight heparin, which was later replaced by a direct oral anticoagulant. The oral anticoagulant therapy was continued for at least 6 months for all patients, with long-term therapy considered for patients who continued to display thromboembolic risk factors. Compression stockings were recommended for all patients. Clinical assessment and ultrasound were planned at 3, 6, and 12 months.

Re-thrombosis was defined as the development of a new thrombus within a previously treated venous segment, as demonstrated by ultrasound assessment. The criteria for diagnosis were non-compressibility of the vein, visualization of echogenic material within the vein, and decreased or absent color flow on color Doppler assessment.

Study Endpoints

The primary endpoint was technical success, defined as restoration of inline venous flow with at least partial (≥50%) thrombus burden reduction on completion venography.

Secondary Endpoints Included:

- Periprocedural complications
- In-hospital outcomes
- Freedom from re-thrombosis during follow-up

PTS was not systematically evaluated using validated scoring systems during the study period.

Statistical Analysis

Continuous variables are expressed as means and standard deviations, whereas categorical variables are expressed as counts and percentages. Freedom from re-thrombosis was estimated by Kaplan-Meier analysis at

3, 6, and 12 months. The 95% confidence interval was calculated using Greenwood's formula with a log-log transformation. Because the sample was small, regression analysis was not performed to avoid overfitting. Statistical analysis was performed using SPSS software, version 22.0. Statistical significance was set at $p<0.05$ for two-tailed tests.

Results

Patient Characteristics

A total of 50 consecutive patients with acute iliofemoral DVT were enrolled in the study. The mean patient age was 55.0±13.8 years, with 28 patients (56.0%) being male. The mean duration of previous symptoms before presentation was 6.5±3.7 days. The most common presenting features were limb swelling and pain, occurring in 94.0% and 92.0% of patients, respectively. Phlegmasia was observed in 6.0% of the patients (three patients). Left iliofemoral DVT was observed in 60.0% of the patients. The thrombus was observed in the common iliac vein in 56.0% of patients, in the external iliac vein in 40.0%, and in the femoral vein in all patients. The involvement of the IVC was observed in 2.0% of the patients. The baseline patient demographics are presented in Table 1.

Procedural Outcomes

Technical success, as indicated by the restoration of venous flow with at least 50% thrombus removal on completion venography, was achieved in 46 patients (92.0%). Adjunctive balloon angioplasty for venous narrowing was needed in four patients (8.0%). Venous stenting was not required in any patient in accordance with the stent-free protocol. The mean duration of stay in the hospital was 3.5±1.0 days, and the mean duration of stay in the intensive care unit was 1.3±0.6 days. Table 2 shows detailed procedural and clinical results.

Safety Outcomes

No procedure-related deaths or symptomatic pulmonary embolisms occurred during hospitalization. No major bleeding complications were encountered. Minor complications were encountered in five patients (10.0%), including hematuria in three patients (6.0%) and access-site hematoma in two patients (4.0%). All minor complications were managed conservatively without further intervention.

Follow-up and Re-thrombosis

Of the total patients, 5 (10.0%) were lost to follow-up. The Kaplan-Meier method was used to estimate freedom from re-thrombosis, yielding rates of 97.5% at 3 months, 92.5% at 6 months, and 87.5% at 12 months. The Kaplan-Meier survival curve for the rate of freedom from re-thrombosis during the 12-month follow-up period is presented in Figure 1.

Discussion

The current study aimed to evaluate the procedural feasibility, safety, and mid-term results of a standardized stent-free PMT-CDT approach for patients with acute

Table 1. Baseline demographic and clinical characteristics of patients with acute iliofemoral DVT (n=50)

Variable	Value
Age, years	55.0±13.8
Male sex	28 (56.0%)
Symptom duration, days	6.5±3.7
Hypertension	19 (38.0%)
Diabetes mellitus	15 (30.0%)
Smoking	15 (30.0%)
Recent major surgery	8 (16.0%)
Malignancy	5 (10.0%)
Hypercoagulable state	4 (8.0%)
Limb swelling	47 (94.0%)
Limb pain	46 (92.0%)
Phlegmasia	3 (6.0%)
Left-sided DVT	30 (60.0%)
Right-sided DVT	19 (38.0%)
Bilateral DVT	1 (2.0%)
Common iliac vein involvement	28 (56.0%)
External iliac vein involvement	20 (40.0%)
Femoral vein involvement	50 (100%)
Inferior vena cava involvement	1 (2.0%)

DVT: Deep vein thrombosis

iliofemoral DVT. The key results of this study show that it has a high success rate, low rates of bleeding complications, and favorable midterm outcomes in carefully selected patients.

One of the most debated issues in the management of iliofemoral DVT with endovascular techniques is the role of venous stenting after removal of thrombi. Although stenting is generally recommended in situations with fixed iliac vein obstruction or with significant residual stenosis, the routine use of stenting still remains debatable[9-11]. Various concerns have been raised about the long-term patency of stents, in-stent restenosis, and the need for further interventions. In the present study, stenting of the veins was not performed because the completion venogram did not show any hemodynamically significant iliac vein obstruction after removal of the thrombi. These findings suggest that a stent-free strategy may also be possible in selected patients after proper removal of thrombus.

Table 2. Procedural and clinical outcomes of stent-free PMT-CDT strategy (n=50)

Variable	Value
Hospital stay, days	3.5±1.0
ICU stay, days	1.3±0.6
Technical success	46 (92.0%)
Adjunctive balloon angioplasty	4 (8.0%)
Venous stent implantation	0 (0%)
Minor bleeding complications	5 (10.0%)
Hematuria	3 (6.0%)
Access-site hematoma	2 (4.0%)
Major bleeding	0 (0%)
Loss to follow-up	5 (10.0%)
Freedom from re-thrombosis at 3 months*	97.5%
Freedom from re-thrombosis at 6 months*	92.5%
Freedom from re-thrombosis at 12 months*	87.5%

**Estimated using Kaplan-Meier analysis*
ICU: Intensive care unit, PMT-CDT: Pharmacomechanical thrombectomy with catheter-directed thrombolysis

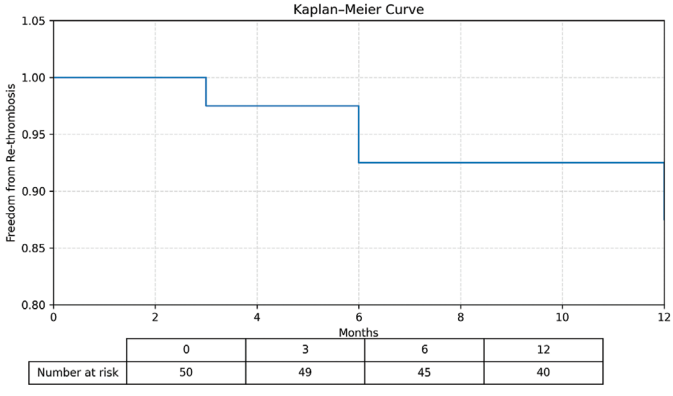

Figure 1. Kaplan-Meier curve of freedom from re-thrombosis at 12 months following stent-free PMT-CDT for acute iliofemoral DVT. Numbers at risk are displayed at 0, 3, 6, and 12 months
DVT: Deep vein thrombosis, PMT-CDT: Pharmacomechanical thrombectomy with catheter-directed thrombolysis

Increasing data suggest that a selective, anatomy-based method of venous stenting may be more advisable than the routine use of stenting following thrombus removal[12]. The rationale for the selective method is to avoid unnecessary stenting in patients without significant underlying obstruction of the iliac veins. In the current series, the restoration of venous flow was considered sufficient following PMT and CDT.

PMT in combination with CDT has also been postulated as a novel hybrid technique that may help in the acceleration of thrombus removal and reduction in the overall thrombolytic use and treatment time when compared to CDT alone[13]. PMT in combination with CDT may help accelerate thrombus removal and improve venous patency in a select group of patients with acute iliofemoral DVT. Notably, PTS may develop in patients even in the absence of recurrent thromboembolic events; hence, the lack of assessment of PTS in the current study makes it difficult to evaluate overall patient benefits.

In addition, previous studies of PMT systems have indicated satisfactory safety of the procedure and low rates of major bleeding complications[14]. Similar to the findings of this study, no major bleeding complications were noted. The minor bleeding complications were conservatively managed without the need for further intervention. Another factor which might have an effect on the long-term results of endovascular treatment of DVT is the anticoagulant therapy used during follow-up[15]. Similar to the results of this study, in which patients

received guideline-concordant anticoagulant therapy, the therapy may have contributed to the satisfactory mid-term rates of freedom from re-thrombosis.

Some limitations of the current study need to be acknowledged. First, the single-center retrospective design of the current study may limit the external validity of the data. Second, the relatively small number of patients limited the ability to perform multivariable modeling to identify independent predictors of re-thrombosis. During the study period, intravascular ultrasound was not commonly used; thus, underlying iliac vein compression syndromes, such as May-Thurner syndrome, may have been undertreated based on venography alone. Temporary IVC filters were commonly used during the study period because of the high thrombus burden and risk of embolization associated with PMT. However, the use of IVC filters is a contentious issue.

On the one hand, loss to follow-up was observed in a minority of patients observed in a minority of patients, which may have affected the Kaplan-Meier estimates of freedom from re-thrombosis. On the other hand, PTS was not evaluated using established clinical scoring tools, which may have influenced the evaluation of long-term functional outcomes. Despite these limitations, the present study provides valuable insights into the effectiveness of a standardized, stent-free strategy combining PMT and CDT in patients with acute iliofemoral DVT. The study results suggest that stent-free PMT combined with CDT may lead to satisfactory outcomes in terms of thrombus removal and mid-term patency rates in carefully selected patients. However, these results must be interpreted with caution, as they may not provide concrete evidence of the effectiveness of stent-free PMT-CDT in patients with acute iliofemoral DVT; rather, they may generate a hypothesis that can be tested in prospective studies.

Future prospective studies, including a standardized imaging evaluation, assessment of PTS, and a higher number of patients, are needed to clearly delineate the role of stent-free PMT-CDT.

Study Limitations

This study has several noteworthy limitations. Included among these is the fact that the study was performed retrospectively at a single center, which increases the risk of selection bias. The relatively low number of patients limited the capacity for risk analysis of re-thrombosis. Because intravascular ultrasound was not performed, venography alone carried a risk of failing to detect mild forms of iliac vein compression, such as May-Thurner syndrome. Because temporary IVC filters were used routinely during the study, the results may not be universally applicable. Because a minority of patients were lost to follow-up, there was a risk that Kaplan-Meier estimates of time to re-thrombosis were influenced by attrition bias. The PTS was not formally assessed using a validated clinical score (such as the Villalta score), which limited the capacity to assess the long-term functional outcomes of the research.

Conclusion

In this study, a standardized, stent-free PMT combined with CDT was used and found to be feasible and safe for the treatment of selected patients with acute iliofemoral in this study, a standardized, stent-free PMT combined with CDT was used and found to be feasible and safe for the treatment of selected patients with acute iliofemoral DVT. However, the study should be viewed with caution due to its descriptive nature, small sample size, and lack of a standardized method for assessing patient outcomes. Further studies are recommended to fully establish the role of PMT in the treatment of iliofemoral DVT.

Ethics

Ethics Committee Approval: Ethical approval for the study was obtained from the Ordu University Clinical Research Ethics Committee (approval no: 2020/225; date: 27.10.2020).

Informed Consent: Informed consent was not required for this retrospective study.

Footnotes

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References

1. Vedantham S, Goldhaber SZ, Julian JA, et al. Pharmacomechanical catheter-directed thrombolysis for deep-vein thrombosis. N Engl J Med. 2017;377:2240-52.
2. Kahn SR, Julian JA, Kearon C, et al. Long-term outcomes after pharmacomechanical catheter-directed thrombolysis for deep vein thrombosis: follow-up of the ATTRACT trial. Circulation. 2020;141:1841-53.
3. Masuda EM, Kistner RL, Musukasong K, et al. Early thrombus removal strategies and prevention of post-thrombotic syndrome. Phlebology. 2022;37:3-12.
4. Avgerinos ED, Saadeddin Z, Abou Ali AN, et al. Outcomes of pharmacomechanical thrombectomy versus catheter-directed thrombolysis in iliofemoral deep vein thrombosis. J Vasc Surg Venous Lymphat Disord. 2018;6:27-34.
5. Morrison N, Hager E, Jain A, et al. Contemporary endovascular management of iliofemoral deep vein thrombosis. Vasc Med. 2021;26:318-25.
6. O'Sullivan GJ, Lohan DG, O'Connor OJ, et al. Long-term patency after pharmacomechanical thrombectomy in iliofemoral deep vein thrombosis. Cardiovasc Intervent Radiol. 2019;42:1466-74.
7. Razavi MK, Jaff MR, Miller LE. Safety and effectiveness of pharmacomechanical thrombectomy for lower extremity deep vein thrombosis: a systematic review. J Vasc Interv Radiol. 2015;26:777-85.
8. Ahanchi SS, Stout CL, Panneton JM. Pharmacomechanical thrombectomy with adjunctive catheter-directed thrombolysis reduces treatment time and bleeding risk. Ann Vasc Surg. 2018;48:175-82.
9. Endo M, Shigematsu K, Kato H, et al. Outcomes of catheter-directed thrombolysis with low-dose infusion in proximal deep vein thrombosis. Phlebology. 2021;36:703-10.
10. Taha AG, Arhuidese I, Nejim B, et al. Predictors of stent use and clinical outcomes in iliofemoral deep vein thrombosis. J Vasc Surg. 2018;67:1499-1507.
11. Marston WA, Heffner R, Mendes R, et al. Iliac vein stenting following thrombolysis: long-term patency and reintervention rates. J Vasc Surg. 2020;71:1627-35.
12. Chen Y, Lin P, Guo W, et al. Early thrombus removal versus anticoagulation alone for iliofemoral deep vein thrombosis: a meta-analysis. Int Angiol. 2022;41:245-56.
13. Bashir R, Zack CJ, Zhao H, et al. Nationwide outcomes of pharmacomechanical thrombectomy versus anticoagulation alone in proximal deep vein thrombosis. Circ Cardiovasc Interv. 2018;11:e005866.
14. Schwein A, Patel R, Ruiz D, et al. Complications of pharmacomechanical thrombectomy systems in acute iliofemoral thrombosis. J Thromb Thrombolysis. 2019;48:253-60.
15. Svensson PJ, Schulman S. Direct oral anticoagulants versus warfarin after endovascular therapy for deep vein thrombosis. Thromb Res. 2021;202:131-8.

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Association between Glycemic Control and Adverse Outcomes in Atrial Fibrillation: Evidence from a Large Real-world Cohort

Ekow Essien[1], Abena Agyekum[2], Abraham Carboo[3], Gloria Amoako[2], Justice Owusu-Achiaw[4]

[1]Advocate Aurora Health Care, Clinic of Internal Medicine, Wisconsin, USA
[2]SUNY Downstate Health Sciences University Faculty of Medicine, Department of Medicine, Brooklyn, USA
[3]Yale-Waterbury Hospital, Clinic of Medicine, Waterbury, USA
[4]37 Military Hospital, Clinic of Polyclinic, Accra, Ghana

Abstract

Objectives: Diabetes mellitus is a common comorbidity in patients with atrial fibrillation (AF), but the impact of glycemic control on clinical outcomes in this population remains incompletely characterized. This study aimed to compare clinical outcomes between AF patients with poorly controlled versus well-controlled diabetes mellitus.

Materials and Methods: We performed a retrospective cohort study using the TriNetX Research Network, a global federated health research platform providing access to electronic medical records across 128 healthcare organizations. Adult patients (18-90 years) with type 2 diabetes mellitus and AF were stratified based on HbA1c levels: poorly controlled diabetes (HbA1c ≥7.0%) and well-controlled diabetes (HbA1c ≤6.9%). After propensity score matching for baseline demographics and comorbidities, cohorts of 332,060 patients each were analyzed. The primary outcome was all-cause mortality. Secondary outcomes included cardiogenic shock, heart failure, ventricular tachycardia, acute kidney injury (AKI), cerebrovascular disease, chronic kidney disease (CKD), coronary artery disease (CAD), and hypertension. Outcomes were analyzed using risk analysis and Kaplan-Meier survival analysis with hazard ratios (HRs) and 95% confidence intervals (CIs) over a five-year follow-up period.

Address for Correspondence: Ekow Essien, Advocate Aurora Health Care, Clinic of Internal Medicine, Wisconsin, USA
e-mail: ekowe94@gmail.com **ORCID:** orcid.org/0009-0006-5396-0955
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Results: In this propensity-matched cohort study, patients with poorly controlled diabetes demonstrated significantly higher all-cause mortality compared to those with well-controlled diabetes (26.3% vs. 25.6%; HR: 1.070, 95% CI: 1.060-1.080; p<0.001). Poor glycemic control was associated with increased risk of heart failure (23.1% vs. 22.8%; HR: 1.071, 95% CI: 1.056-1.086; p<0.001), AKI (19.8% vs. 18.3%; HR: 1.132, 95% CI: 1.117-1.148; p<0.001), and CKD (19.4% vs. 17.8%; HR: 1.161, 95% CI: 1.145-1.178; p<0.001). Poorly controlled patients also had higher rates of CAD (18.3% vs. 17.9%; HR: 1.079, 95% CI: 1.062-1.096; p<0.001). Conversely, well-controlled diabetes was associated with reduced cardiogenic shock (2.2% vs. 2.3%; HR: 0.995, 95% CI: 0.963-1.028; p=0.771) and ventricular tachycardia (5.1% vs. 4.8%; HR: 0.977, 95% CI: 0.956-1.000; p=0.048).

Conclusion: Among patients with diabetes mellitus and AF, poor glycemic control is associated with significantly increased mortality and higher rates of cardiovascular and renal complications. These findings emphasize the importance of optimal glycemic control in diabetic patients with AF to improve clinical outcomes and reduce adverse events.

Keywords: Atrial fibrillation, diabetes mellitus, glycemic control, hemoglobin A1c, mortality, heart failure, acute kidney injury

Introduction

Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia, affecting over 33 million people worldwide and representing a significant public health burden[1]. The prevalence of AF continues to increase with aging populations and rising cardiovascular comorbidities[2]. Among these comorbidities, diabetes mellitus stands out as one of the most prevalent and clinically significant, affecting approximately 20-25% of patients with AF[3]. The relationship between diabetes mellitus and AF is complex and bidirectional. Diabetes increases the risk of developing AF by approximately 40%, while patients with established AF have a higher prevalence of diabetes compared to the general population[4]. This association is mediated through multiple pathophysiological mechanisms, including structural cardiac remodeling, autonomic dysfunction, inflammation, and metabolic disturbances that create a substrate for arrhythmogenesis[5].

The coexistence of diabetes and AF creates a particularly high-risk clinical scenario. Both conditions independently increase the risk of stroke, heart failure, and cardiovascular mortality, and their combination appears to have synergistic effects on adverse outcomes[6]. Furthermore, diabetes complicates the management of AF by increasing bleeding risk with anticoagulation and potentially affecting the efficacy of rate and rhythm control strategies[7].

While the importance of glycemic control in diabetic patients is well-established, the specific impact of HbA1c levels on clinical outcomes in patients with concomitant AF remains incompletely characterized. Most studies have focused on the general diabetic population or specific cardiovascular subgroups, but comprehensive data examining outcomes across the spectrum of glycemic control in AF patients are limited[8].

Understanding the relationship between glycemic control and outcomes in AF patients has important clinical implications. Poor glycemic control may exacerbate the pathophysiological mechanisms underlying AF complications, including endothelial dysfunction, increased thrombogenicity, accelerated atherosclerosis, and worsening heart failure[9]. Conversely, tight glycemic control might reduce these risks but could also introduce hypoglycemic episodes that may trigger arrhythmias[10].

Recent guidelines emphasize individualized approaches to diabetes management, particularly in patients with multiple comorbidities[11]. However, specific

recommendations for glycemic targets in patients with AF are lacking, largely due to insufficient evidence from large-scale studies. This knowledge gap is particularly relevant given the expanding population of patients with both conditions and the need for evidence-based management strategies.

Therefore, we conducted this large-scale, propensity-matched study using a federated health research network to comprehensively evaluate the association between glycemic control and clinical outcomes in patients with diabetes mellitus and AF. We hypothesized that poor glycemic control would be associated with increased mortality and higher rates of cardiovascular complications in this high-risk population.

Materials and Methods

Data Source

This study utilized data from the TriNetX Research Network, a global federated health research platform providing access to electronic medical records (diagnoses, procedures, medications, laboratory values) across large healthcare organizations (HCOs). For this analysis, we used data from 128 HCOs within the Global Collaborative Network, representing a diverse array of healthcare settings across multiple geographic regions. The platform allows for real-time queries and robust analysis of de-identified patient data while maintaining privacy and security.

Study Population

We identified adult patients (aged 18-90 years) with both type 2 diabetes mellitus (ICD-10 code E11) and AF (ICD-10 codes I48.91, I48.0, I48.1, I48.2, I48.19, I48.21, I48.20, I48.11). From this population, we created two cohorts based on glycemic control: (1) poorly controlled diabetes defined by HbA1c ≥7.0% (TNX: 9037 or UMLS: LNC:4548-4), and (2) well-controlled diabetes defined by HbA1c ≤6.9% using the same laboratory codes.

The index date was defined as the first date when patients met all inclusion criteria (diabetes, AF, and qualifying HbA1c level). Both cohorts were followed for up to five years (1,825 days) after the index date, with a time window starting 1 day after the index event.

Our cohort included patients with all types of AF (paroxysmal, persistent, chronic, permanent, longstanding persistent, and unspecified) to provide a comprehensive real-world representation of AF patients with diabetes. This inclusive approach reflects actual clinical practice where AF subtype may vary over time or may be incompletely characterized across different healthcare settings.

All patients meeting initial inclusion criteria were followed for the entire observation period using an intention-to-treat approach. No patients were excluded during follow-up based on receiving interventions such as cardioversion, ablation, or antiarrhythmic drugs, as these treatments represent standard AF management and excluding patients receiving them would compromise generalizability.

Outcomes

The primary outcome was all-cause mortality within the follow-up period. Secondary outcomes included cardiogenic shock (ICD-10 code R57.0), heart failure (ICD-10 codes I50.x), ventricular tachycardia (ICD-10 codes I47.2, I47.20), acute kidney injury (ICD-10 codes N17, N17.9), cerebrovascular disease (ICD-10 codes I60-I69), chronic kidney disease (ICD-10 code N18) and coronary artery disease (ICD-10 codes I25.1, I25.10)

For each outcome, we excluded patients who had experienced the specific outcome before the index date to ensure we were capturing incident events during the follow-up period.

Propensity Score Matching

To minimize confounding by indication and create comparable cohorts, we employed propensity score matching. Propensity scores were calculated based on baseline demographics including age, sex, race, and ethnicity; and clinical comorbidities including acute kidney failure and chronic kidney disease, metabolic disorders, and hypertensive diseases.

Patients in the poorly controlled and well-controlled diabetes groups were matched 1:1 using nearest-neighbor matching. Balance between the matched cohorts was assessed using standardized mean differences, with values <0.1 considered indicative of good balance.

Statistical Analysis

Baseline characteristics were compared between the matched groups using standardized mean differences and p-values. For the primary and secondary outcomes, we employed risk analysis calculating the risk (proportion of patients experiencing the outcome) in each cohort, risk difference, risk ratio, and odds ratio with 95% confidence intervals (CIs). Kaplan-Meier survival analysis was performed to generate survival curves and estimate the probability of each outcome over time. Log-rank tests were used to compare survival distributions between cohorts, with hazard ratios (HRs) and 95% CIs calculated using Cox proportional hazards models.

All analyses were conducted using the TriNetX platform's built-in analytics tools. A two-sided p-value <0.05 was considered statistically significant.

Ethical Considerations

This study utilized de-identified data from the TriNetX Research Network, which complies with all relevant data protection regulations. As the study used only de-identified data, it was determined to be exempt from Institutional Review Board approval according to 45 CFR 46.104(d)(4). The study was conducted in accordance with the Declaration of Helsinki and the STROBE guidelines for reporting observational studies.

Results

Study Population and Baseline Characteristics

Before propensity score matching, we identified 339,206 patients with AF and poorly controlled diabetes (Cohort 1) and 594,706 patients with AF and well-controlled diabetes (Cohort 2). After propensity score matching, 332,060 patients remained in each cohort.

The baseline characteristics of the matched cohorts are presented in Table 1. The matched groups were well-balanced in terms of demographics and comorbidities, with standardized mean differences <0.02 for most variables,

Table 1. Baseline characteristics of propensity-matched cohorts

Characteristic	Poorly controlled diabetes (n=332,060)	Well-controlled diabetes (n=332,060)	p-value	Standardized difference
Demographics				
Age (years), mean ± SD	76.0±11.2	76.0±11.4	0.827	0.001
Age at index (years), mean ± SD	70.7±11.5	70.7±11.6	0.802	0.001
Female, n (%)	125,680 (37.8%)	124,166 (37.4%)	<0.001	0.009
Male, n (%)	191,498 (57.7%)	192,613 (58.0%)	0.006	0.007
Race, n (%)				
White	222,478 (67.0%)	224,534 (67.6%)	<0.001	0.013
Black or African American	42,099 (12.7%)	41,129 (12.4%)	<0.001	0.009
Asian	16,541 (5.0%)	16,224 (4.9%)	0.072	0.004
Ethnicity, n (%)				
Not Hispanic or Latino	232,619 (70.1%)	233,653 (70.4%)	0.006	0.007
Hispanic or Latino	18,573 (5.6%)	18,266 (5.5%)	0.100	0.004
Comorbidities, n (%)				
Acute kidney failure and CKD	135,537 (40.8%)	136,696 (41.2%)	0.004	0.007
Metabolic disorders	253,817 (76.4%)	254,735 (76.7%)	0.008	0.007
Hypertensive diseases	267,234 (80.5%)	267,677 (80.6%)	0.170	0.003

SD: Standard deviation, CKD: Chronic kidney disease

indicating excellent balance. The mean age was 76.0±11.2 years in the poorly controlled group and 76.0±11.4 years in the well-controlled group. Female representation was similar between groups (37.8% vs. 37.4%). The prevalence of key comorbidities was comparable, including acute kidney failure and chronic kidney disease (40.8% vs. 41.2%), metabolic disorders (76.4% vs. 76.7%), and hypertensive diseases (80.5% vs. 80.6%).

Primary Outcome: All-cause Mortality

The primary outcome of all-cause mortality occurred in 86,693 patients (26.3%) in the poorly controlled diabetes group compared to 84,273 patients (25.6%) in the well-controlled diabetes group (risk ratio 1.029, 95% CI: 1.021-1.038; p<0.001) (Table 2). The Kaplan-Meier survival analysis demonstrated significantly lower survival probability in the poorly controlled diabetes group compared to the well-controlled group (60.54% vs. 62.55% at the end of the 5-year follow-up period; HR: 1.070, 95% CI: 1.060-1.080; p<0.001) (Figure 1).

Secondary Outcomes

Poor glycemic control was associated with significantly higher incidence of several major cardiovascular and renal outcomes. Heart failure occurred in 41,363 patients (23.1%) in the poorly controlled group versus 40,607 patients (22.8%) in the well-controlled group (HR: 1.071, 95% CI: 1.056-1.086; p<0.001) (Figure 2A).

Acute kidney injury affected 43,545 patients (19.8%) in the poorly controlled group compared to 40,903 patients (18.3%) in the well-controlled group (HR: 1.132, 95% CI: 1.117-1.148; p<0.001) (Figure 2B). Similarly, chronic kidney disease developed in 40,034 patients (19.4%) in the poorly controlled group versus 36,702 patients (17.8%) in the well-controlled group (HR: 1.161, 95% CI: 1.145-1.178; p<0.001).

Coronary artery disease occurred in 30,371 patients (18.3%) in the poorly controlled group compared to 31,004 patients (17.9%) in the well-controlled group (HR: 1.079, 95% CI: 1.062-1.096; p<0.001). Cerebrovascular disease affected 29,497 patients (12.4%) in the poorly controlled group versus 28,790 patients (12.3%) in the well-controlled group (HR: 1.056, 95% CI: 1.039-1.073; p<0.001).

Conversely, some outcomes showed lower rates in the poorly controlled group. Cardiogenic shock occurred in 7,020 patients (2.2%) in the poorly controlled group versus 7,295 patients (2.3%) in the well-controlled group (HR: 0.995, 95% CI: 0.963-1.028; p=0.771). Ventricular tachycardia affected 14,638 patients (4.8%) in the poorly controlled group compared to 15,381 patients (5.1%) in the well-controlled group (HR: 0.977, 95% CI: 0.956-1.000; p=0.048).

Table 2. Risk ratios and hazard ratios of primary and secondary outcomes

Outcome	Poorly controlled diabetes (n=332,060)	Well-controlled diabetes (n=332,060)	Risk ratio (95% CI)	Hazard ratio (95% CI)	p-value
Primary outcome					
All-cause mortality	86,693 (26.3%)	84,273 (25.6%)	1.029 (1.021-1.038)	1.070 (1.060-1.080)	<0.001
Secondary outcomes					
Heart failure	41,363 (23.1%)	40,607 (22.8%)	1.013 (1.001-1.025)	1.071 (1.056-1.086)	<0.001
Acute kidney injury	43,545 (19.8%)	40,903 (18.3%)	1.078 (1.065-1.091)	1.132 (1.117-1.148)	<0.001
Chronic kidney disease	40,034 (19.4%)	36,702 (17.8%)	1.087 (1.073-1.101)	1.161 (1.145-1.178)	<0.001
Coronary artery disease	30,371 (18.3%)	31,004 (17.9%)	1.017 (1.003-1.032)	1.079 (1.062-1.096)	<0.001
Cerebrovascular disease	29,497 (12.4%)	28,790 (12.3%)	1.011 (0.996-1.027)	1.056 (1.039-1.073)	<0.001
Cardiogenic shock	7.020 (2.2%)	7,295 (2.3%)	0.957 (0.925-0.989)	0.995 (0.963-1.028)	0.771
Ventricular tachycardia	14,638 (4.8%)	15,381 (5.1%)	0.938 (0.918-0.959)	0.977 (0.956-1.000)	0.048

CI: Confidence interval

Discussion

In this large propensity-matched cohort study of over 664,000 patients with diabetes mellitus and AF, we found that poor glycemic control was associated with significantly higher all-cause mortality and increased risk of major cardiovascular and renal complications. These findings provide important real-world evidence regarding the impact of glycemic control on clinical outcomes in this high-risk population.

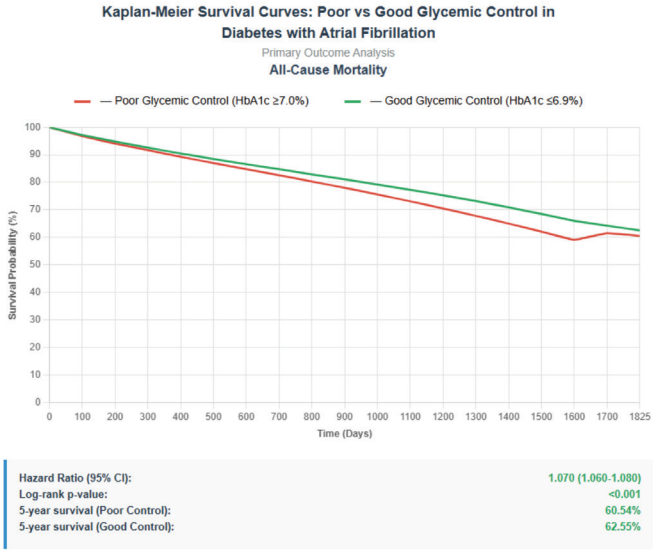

Figure 1. Kaplan-Meier survival curves for all-cause mortality
This figure shows survival probability over time (days) for patients with poorly controlled diabetes (orange line) versus well-controlled diabetes (green line). The poorly controlled diabetes group demonstrates lower survival probability throughout the follow-up period
CI: Confidence interval

Our findings of increased mortality with poor glycemic control align with previous studies in diabetic populations, but extend these observations specifically to patients with concomitant AF[12]. The 7% relative increase in mortality risk associated with poor glycemic control, while modest, represents a clinically significant difference given the large absolute number of patients affected and the already elevated baseline risk in this population.

The increased risk of heart failure associated with poor glycemic control is particularly noteworthy given the bidirectional relationship between diabetes and heart failure[13]. Poor glycemic control contributes to myocardial dysfunction through multiple mechanisms, including advanced glycation end products, oxidative stress, microvascular dysfunction, and metabolic alterations[14]. In patients with AF, these effects may be amplified by the hemodynamic consequences of irregular heart rhythm and the potential for tachycardia-induced cardiomyopathy.

The strong association between poor glycemic control and both acute and chronic kidney disease represents another critical finding with important clinical implications.

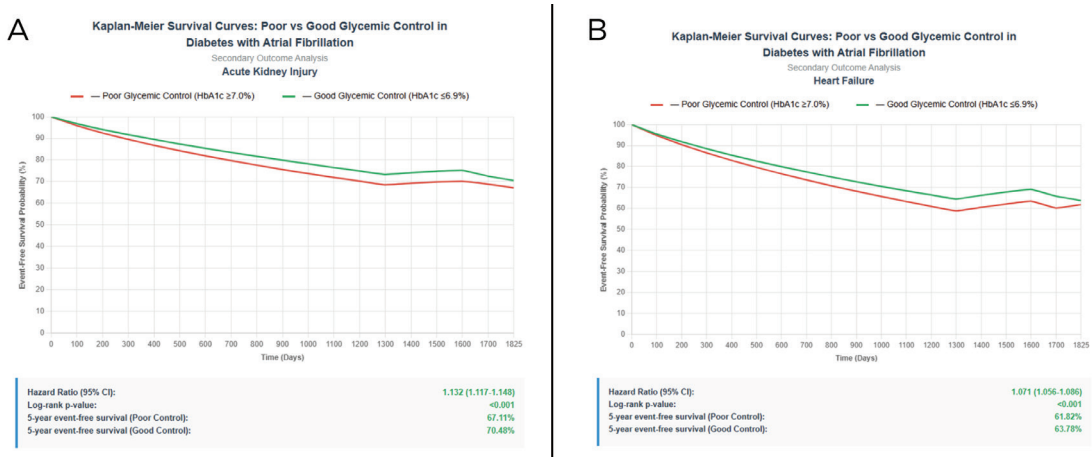

Figure 2 A, B. Kaplan-Meier curves for key secondary outcomes
A) Heart failure: event-free probability for heart failure over time, with the poorly controlled diabetes group showing higher event rates. B) Acute kidney injury: event-free probability for acute kidney injury over time, demonstrating increased risk in the poorly controlled diabetes group
CI: Confidence interval

Diabetic nephropathy is a well-recognized complication of diabetes, but our results suggest that the risk may be particularly pronounced in patients with concomitant AF[15]. This finding is concerning given that chronic kidney disease further increases cardiovascular risk and complicates anticoagulation management in AF patients.

The increased risk of coronary artery disease and cerebrovascular disease with poor glycemic control underscores the systemic vascular effects of hyperglycemia[16]. These findings are consistent with the established role of diabetes as a major risk factor for atherosclerotic cardiovascular disease, but highlight the particular vulnerability of patients with both diabetes and AF.

Interestingly, we observed lower rates of certain outcomes in the poorly controlled diabetes group, including cardiogenic shock, ventricular tachycardia, and pulmonary embolism. These seemingly paradoxical findings may reflect several factors, including differences in healthcare utilization patterns, competing risks, or differential coding practices between patient groups. The lower rate of ventricular tachycardia in poorly controlled patients might reflect the predominance of atrial arrhythmias in this population or differences in monitoring intensity.

The mechanisms underlying the adverse effects of poor glycemic control in AF patients are likely multifactorial. Hyperglycemia promotes endothelial dysfunction, increases oxidative stress, enhances inflammation, and accelerates atherosclerosis[17]. In the context of AF these effects may be particularly detrimental due to the increased thrombotic risk, irregular hemodynamics, and potential for rapid ventricular rates that characterize this arrhythmia.

Our study has several important clinical implications. First, it emphasizes the critical importance of achieving and maintaining optimal glycemic control in diabetic patients with AF. The current findings support more aggressive diabetes management in this population, potentially including earlier initiation of combination therapy and more frequent monitoring.

Second, our results suggest that patients with both diabetes and AF represent a particularly high-risk group that may benefit from enhanced surveillance and preventive interventions. This might include more frequent cardiovascular risk assessments, earlier implementation of cardioprotective medications, and closer monitoring for complications such as heart failure and kidney disease.

Third, the findings highlight the need for integrated care approaches that address both conditions simultaneously. This may involve collaboration between cardiologists, endocrinologists, and primary care providers to optimize management of both diabetes and AF[18].

The influence of rate control strategies on outcomes in AF is well established, with landmark trials such as RACE and AFFIRM demonstrating the impact of rate versus rhythm control on mortality and morbidity. Our study did not specifically account for rate control medications or adequacy of ventricular rate control, as these variables involve complex confounding by indication and require granular clinical data not consistently available in large electronic health record databases. It is possible that differences in rate control between our cohorts could have influenced outcomes. However, our primary focus was on the association between glycemic control and outcomes, independent of specific medication effects. Future prospective studies should investigate the interaction between glycemic control, rate control strategies, and clinical outcomes in AF patients with diabetes[18-20].

Study Limitations

Several limitations of our study should be acknowledged. As an observational study, residual confounding cannot be excluded despite robust propensity matching. The use of a single HbA1c measurement to define glycemic control may not capture the full complexity of glucose management over time. A limitation of our propensity matching approach is that specific stroke and bleeding history were not included as discrete matching variables, though broad comorbidity categories and outcome-specific exclusion criteria were applied. The TriNetX database

structure did not permit calculation of composite clinical risk scores such as CHA2DS2-VASc and HAS-BLED, which would have provided additional risk stratification. However, key components of these scores, including age, sex, hypertension, and kidney disease, were included in our propensity matching. Our study included all AF subtypes rather than stratifying by AF pattern (paroxysmal, persistent, permanent), which enhances generalizability but precludes subtype-specific analyses. The relationship between glycemic control and outcomes may potentially vary by AF type, which warrants investigation in future studies. Additionally, specific diabetes medications and their potential cardioprotective effects could not be fully characterized in our analysis.

Despite these limitations, our study has important strengths, including the large sample size, diverse patient population, comprehensive assessment of outcomes, and robust propensity matching. The consistency of our findings across multiple outcome measures and their biological plausibility strengthen the validity of our conclusions.

Conclusion

In this large propensity-matched cohort study of patients with diabetes mellitus and AF, poor glycemic control was associated with significantly higher all-cause mortality and increased risk of cardiovascular and renal complications. These findings emphasize the critical importance of optimal glycemic control in diabetic patients with AF and support the need for integrated management approaches that address both conditions.

Our results provide real-world evidence supporting intensive diabetes management in patients with concomitant AF. The increased risks associated with poor glycemic control highlight the need for individualized treatment strategies that balance glycemic targets with other cardiovascular risk factors.

Future research should focus on identifying optimal glycemic targets for patients with both diabetes and AF, evaluating the effectiveness of specific diabetes medications in this population, and developing integrated care models that optimize outcomes for both conditions. Prospective randomized trials examining glycemic management strategies specifically in AF patients would provide higher-quality evidence to inform clinical practice guidelines.

Ethics

Ethics Committee Approval: This study utilized de-identified data from the TriNetX Research Network and was determined to be exempt from Institutional Review Board approval according to 45 CFR 46.104(d)(4).

Informed Consent: This study used anonymized data from the TriNetX Research Network.

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Footnotes

Authorship Contributions

Surgical and Medical Practices: Essien E, Agyekum A, Carboo A, Amoako G, Owusu-Achiaw J, Concept: Essien E, Agyekum A, Carboo A, Amoako G, Design: Essien E, Agyekum A, Carboo A, Amoako G, Owusu-Achiaw J, Data Collection and/or Processing: Essien E, Agyekum A, Carboo A, Amoako G, Analysis and/or Interpretation: Essien E, Agyekum A, Carboo A, Literature Search: Essien E, Agyekum A, Writing: Essien E, Amoako G, Owusu-Achiaw J.

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References

1. Chugh SS, Havmoeller R, Narayanan K, et al. Worldwide epidemiology of atrial fibrillation: a Global Burden of Disease 2010 Study. Circulation. 2014;129:837-47.

2. Kornej J, Börschel CS, Benjamin EJ, Schnabel RB. Epidemiology of atrial fibrillation in the 21st century: novel methods and new insights. Circ Res. 2020;127:4-20.

3. Shantsila E, Choi EK, Lane DA, Joung B, Lip GYH. Atrial fibrillation: comorbidities, lifestyle, and patient factors. Lancet Reg Health Eur. 2024;37:100784.

4. Huxley RR, Filion KB, Konety S, et al. Meta-analysis of cohort and case-control studies of type 2 diabetes mellitus and risk of atrial fibrillation. Am J Cardiol. 2011;108:56-62.

5. Pellman J, Sheikh F. Atrial fibrillation: mechanisms, therapeutics, and future directions. Compr Physiol. 2015;5:649-65.

6. Pallisgaard J, Greve AM, Lock-Hansen M, et al. Atrial fibrillation onset before heart failure or vice versa: what is worst? A nationwide register study. Europace. 2023;25:283-90.

7. Papazoglou AS, Kartas A, Moysidis DV, et al. Glycemic control and atrial fibrillation: an intricate relationship, yet under investigation. Cardiovasc Diabetol. 2022;21:39.

8. Echouffo-Tcheugui JB, Shrader P, Thomas L, et al. Care patterns and outcomes in atrial fibrillation patients with and without diabetes: ORBIT-AF Registry. J Am Coll Cardiol. 2017;70:1325-35.

9. Emerging Risk Factors Collaboration; Sarwar N, Gao P, et al. Diabetes mellitus, fasting blood glucose concentration, and risk of vascular disease: a collaborative meta-analysis of 102 prospective studies. Lancet. 2010;375:2215-22.

10. Sun DK, Zhang N, Liu Y, et al. Dysglycemia and arrhythmias. World J Diabetes. 2023;14:1163-77.

11. Sugandh F, Chandio M, Raveena F, et al. Advances in the management of diabetes mellitus: a focus on personalized medicine. Cureus. 2023;15:e43697.

12. Papazoglou AS, Kartas A, Moysidis DV, et al. Glycemic control and atrial fibrillation: an intricate relationship, yet under investigation. Cardiovasc Diabetol. 2022;21:39.xxx

13. Kenny HC, Abel ED. Heart failure in type 2 diabetes mellitus. Circ Res. 2019;124:121-41.

14. Jia G, Hill MA, Sowers JR. Diabetic cardiomyopathy: an update of mechanisms contributing to this clinical entity. Circ Res. 2018;122:624-38.

15. Arnous MM, Al Saidan AA, Al Dalbhi S, et al. Association of atrial fibrillation with diabetic nephropathy: a meta-analysis. J Family Med Prim Care. 2022;11:3880-4.

16. Laakso M, Kuusisto J. Insulin resistance and hyperglycaemia in cardiovascular disease development. Nat Rev Endocrinol. 2014;10:293-302.

17. Brownlee M. The pathobiology of diabetic complications: a unifying mechanism. Diabetes. 2005;54:1615-25.

18. Heodorakis N, Nikolaou M, Krentz A. Cardiovascular-endocrine-metabolic medicine: proposing a new clinical sub-specialty amid the cardiometabolic pandemic. Biomolecules. 2025;15:373.

19. Hagens VE, Crijns HJ, Van Veldhuisen DJ, et al. Rate control versus rhythm control for patients with persistent atrial fibrillation with mild to moderate heart failure: results from the RAte control versus electrical cardioversion (RACE) study. Am Heart J. 2005;149:1106-11.

20. Wyse DG, Waldo AL, DiMarco JP, et al. A comparison of rate control and rhythm control in patients with atrial fibrillation. N Engl J Med. 2002;347:1825-33.

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A Rare Case of Mitral Valve Myxoma Presenting with ST-elevation Myocardial Infarct

Putra Imanullah[1], Abinisa Inaya Taim[2], Filianmi Dyospama Patandianan[2], Pendrik Tandean[2], Jayarasti Kusumanegara[1,3]

[1]Hasanuddin University Faculty of Medicine, Department of Surgery, Makassar, Indonesia
[2]Hasanuddin University Faculty of Medicine, Department of Cardiology and Vascular Medicine, Makassar, Indonesia
[3]Hasanuddin University Faculty of Medicine, Department of Cardiothoracic and Vascular Surgery, Makassar, Indonesia

Abstract

The differential diagnosis of a mitral valve mass includes infectious vegetation, papillary fibroelastoma, and, rarely, cardiac myxoma. Distinguishing these masses from other valvular lesions is crucial, as the management strategies can differ significantly. We present a case of a 69-year-old man admitted to the cardiac emergency unit with chest pain. Further investigations revealed ST-elevation myocardial infarction affecting both the anteroseptal and inferior walls, along with pulmonary edema. Transthoracic echocardiography revealed severe mitral regurgitation associated with an oscillating mass originating from the anterior mitral leaflet, measuring 13 mm x 10 mm. Despite negative blood cultures, the mitral valve mass was initially managed as infective endocarditis. However, the patient failed to demonstrate any significant clinical improvement. Subsequent coronary angiography identified two-vessel coronary artery disease with a SYNTAX II score of 22. Given these findings, the decision was made to proceed with coronary artery bypass grafting in conjunction with resection of the mitral valve mass and mitral valve replacement. Histopathological analysis of the excised tissue ultimately revealed the characteristics of a cardiac myxoma.

Keywords: Myxoma, valvular mass, ST-elevation myocardial infarction, valve surgery

Address for Correspondence: Abinisa Inaya Taim, Hasanuddin University Faculty of Medicine, Department of Cardiology and Vascular Medicine, Makassar, Indonesia
e-mail: abinisainaya@gmail.com **ORCID:** orcid.org/0009-0003-7955-6801
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Introduction

Approximately 75% of primary cardiac tumors are benign, with myxomas being the most prevalent type[1]. Most cardiac myxomas arise from the fossa ovalis, while those originating from the heart valves are rare. We present a rare case of a cardiac myxoma originating from the mitral valve that presented with ST-elevation myocardial infarction (STEMI).

Case Presentation

A 69-year-old male presented to the cardiac emergency unit with typical chest pain of 26 hours' duration. He had a history of milder chest pain 5 months earlier and intermittent shortness of breath for 3 months, which worsened the day before admission. The patient has a 25-year history of uncontrolled hypertension, is an active smoker, and has diabetes requiring insulin. On examination, he had stage I hypertension, an elevated respiratory rate, and a 3/6 apical systolic murmur. No other abnormalities were noted.

The electrocardiogram revealed an STEMI involving the anteroseptal and inferior walls. Transthoracic echocardiography demonstrated severe mitral regurgitation with an oscillating mass originating from the anterior mitral leaflet, measuring 13 mm x 10 mm, suggestive of infective endocarditis (Figure 1). However, blood cultures were negative. Despite treatment for infective endocarditis, the patient showed no clinical improvement.

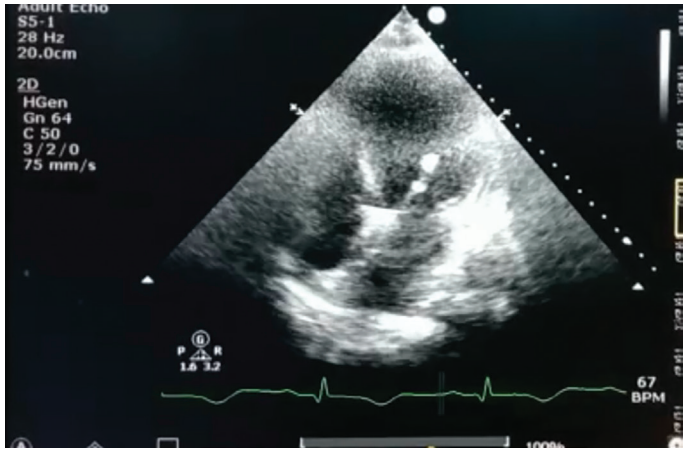

Figure 1. Transthoracic echocardiography showing a regular mass measuring 13 mm x 10 mm located on the anterior mitral leaflet

Coronary angiography revealed 80-90% diffuse stenosis of the mid-distal left anterior descending (LAD) artery with calcification, 80% stenosis of the proximal right coronary artery (RCA), and 70-80% diffuse stenosis of the proximal-mid RCA.

The patient underwent coronary artery bypass grafting (CABG) combined with mitral valve replacement and mass resection. After full cardiopulmonary bypass was established and the ascending aorta was cross-clamped, antegrade cardioplegia (approximately 2,000 mL of Custodiol) was administered to achieve diastolic arrest. The LAD and distal RCA arteries were prepared, and bypass grafts were fashioned from the great saphenous vein using 7-0 Prolene sutures for anastomoses. Runoff was adequate. Venous cannulation of the superior and inferior venae cavae was performed to complete bypass.

The right atrium was opened, and an incision was made in the atrial septum through the fossa ovalis. The mitral valve, showing anterior leaflet prolapse and annular dilatation, was exposed. The anterior and posterior leaflets were excised (Figure 2), and a mechanical mitral valve was implanted. Following rewarming, the interatrial septum and right atrial wall were sutured, and the heart was de-aired. The aortic cross-clamp time was 114 minutes.

Histological examination revealed stellate cells within myxomatous mitral tissue. Other areas of the tissue showed fibrosis, necrosis, and calcification. These findings were consistent with a diagnosis of myxoma with associated calcification.

Postoperatively, the patient demonstrated clinical improvement and was discharged 10 days after surgery. At a 30-day follow-up, the patient reported minimal exertional dyspnea and no chest pain.

Discussion

Most primary cardiac tumors are benign, with myxomas representing approximately 50% of cases[1,2]. They are typically pedunculated and intra-cavitary, arising most often from the left atrium (≈75 %), followed by the

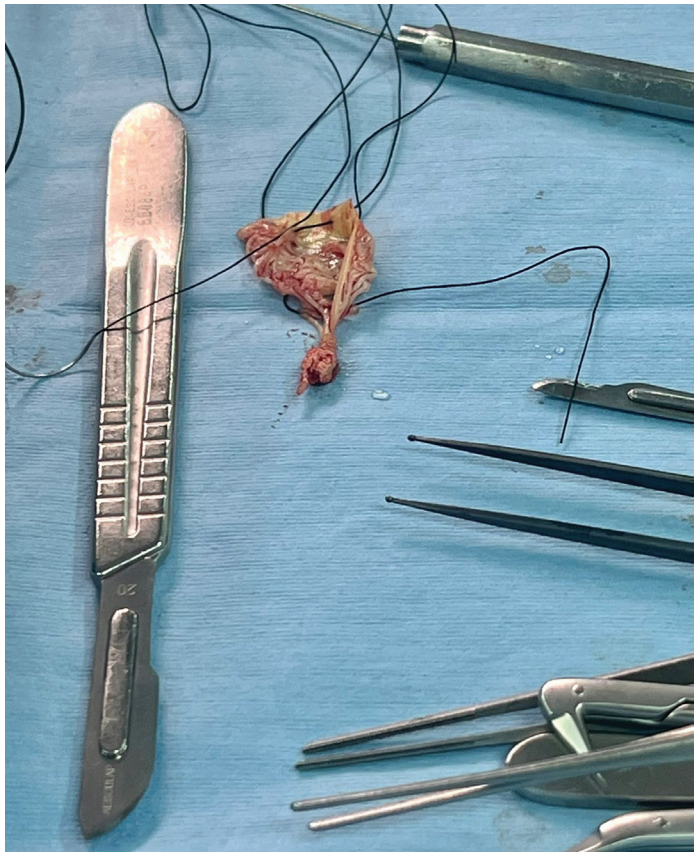

Figure 2. Macroscopic view of the operative specimen. A round and firm mass attached to the anterior mitral leaflet

right atrium (≈18 %) and, less commonly, the ventricles (≈4 %)[1,3]. Valve-origin myxomas are exceedingly rare, and the true incidence of myxomas arising from the mitral valve remains uncertain[1,4].

Clinical manifestations depend on tumor size, location, and mobility. Classic features include (1) systemic embolization, (2) intracardiac obstruction causing exertional dyspnea or pulmonary edema, and (3) constitutional symptoms such as fever or weight loss[5]. Coronary artery embolism leading to acute coronary syndrome is rare, occurring in only ~0.06% of cases[6]. Several recent case reports describe STEMI caused by embolization from cardiac myxomas, including those originating from the mitral valve[7-10].

Our patient illustrates this rare scenario. He presented with STEMI in the setting of diffuse atherosclerotic coronary disease, which made it challenging to distinguish plaque rupture from tumor embolism. Both mechanisms likely contributed to his presentation. Surgical management, consisting of median sternotomy, CABG, mitral valve replacement, and tumor excision, achieved complete resection. Surgery is considered curative, with reported myxoma recurrence rates of 5-14%[1,5].

Ethics

Informed Consent: Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Footnotes

Authorship Contributions

Surgical and Medical Practices: Imanullah P, Taim AI, Patandianan FD, Tandean P, Kusumanegara J, Concept: Imanullah P, Taim AI, Patandianan FD, Design: Imanullah P, Taim AI, Patandianan FD, Data Collection and/or Processing: Imanullah P, Taim AI, Patandianan FD, Analysis and/or Interpretation: Patandianan FD, Tandean P, Kusumanegara J, Literature Search: Imanullah P, Taim AI, Writing: Taim AI, Patandianan FD.

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References

1. Demirdaş E, Atılgan K, Er ZC, Çiçekçioğlu F. Atypically mitral valve originated giant myxoma presenting with acute ST-segment elevation myocardial infarction and acute pulmonary edema. J Surg Med. 2018;2:41-3.
2. Chen RJC, Chou P, Hsieh MJ, et al. Cardiac myxoma with unusual obstructive and embolic manifestations: concurrent stroke and ST-elevation myocardial infarction. Medicine (Baltimore). 2015;94:e776.
3. Peters MJ, Tuwairqi KW, Farah MG. A case of infected left atrial myxoma presenting as ST-elevation myocardial infarction (STEMI). Am J Case Rep. 2019;20:1930-35.
4. Dou D, Xue S, Wang Y, Li Y. Case report: a rare diffuse mitral valvular myxoma. Front Cardiovasc Med. 2024;11:1499553.

5. Vondran M, Ghazy T, Jara A, Orban M. ST-segment elevation myocardial infarction and right atrial myxoma. Eur Heart J Case Rep. 2022;6:ytac262.

6. Silva RRP, Pereira JL, Santos JF. Acute ST-elevation myocardial infarction in a young adult: rare presentation of giant atrial myxoma. Rev Port Cardiol. 2024;43:241.e1-241.e5.

7. Bartolomucci F, Tito A, Navarese EP, et al. STEMI and NSTEMI ACS in a 30-year-old patient: an extremely rare complication of a left atrial myxoma. Heart Surg Forum. 2017;20:E116-8.

8. Reynen K. Cardiac myxomas. N Engl J Med. 1995;333:1610-7.

9. Pinede L, Duhaut P, Loire R. Clinical presentation of left atrial cardiac myxoma: a series of 112 consecutive cases. Medicine (Baltimore). 2001;80:159-72.

10. Lee VH, Connolly HM, Brown RD Jr, et al. Central nervous system manifestations of cardiac myxoma. Arch Neurol. 2007;64:1115-20.

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Prevalence and Clinical Relevance of Extracardiac Findings on Preprocedural Computed Tomography Angiography for Catheter Ablation of Atrial Fibrillation

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During the publication process, a contributing author was inadvertently removed from the author list. This missing author was not included in the "Cite this article as" and "Authorship Contributions" sections.

The missing author name **Oğuzhan Ekrem Turan** and missing author hor position (author position **2**) have been corrected as follows:

Missing author name **Oğuzhan Ekrem Turan** and missing author position (author position **2**)

Reşit Yiğit Yılancıoğlu[1], Mahmut Mustafa Barış[2], Emin Evren Özcan[1]

The added author name **Oğuzhan Ekrem Turan** and the added author position (author position **2**)

Reşit Yiğit Yılancıoğlu[1], **Oğuzhan Ekrem Turan[1],** Mahmut Mustafa Barış[2], Emin Evren Özcan[1]

The name of **Oğuzhan Ekrem Turan** was inadvertently omitted from the "Cite this article as" section.

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Authorship Contributions

Surgical and Medical Practices: Yılancıoğlu RY, Özcan EE, Barış MM, Concept: Yılancıoğlu RY, Özcan EE, Barış MM, Data Collection and/or Processing: Yılancıoğlu RY, Barış MM, Analysis and/or Interpretation: Yılancıoğlu RY, Writing: Yılancıoğlu RY.

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