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Original Article

Establishment and application of an intraoperative reperfusion arrhythmia prediction model for PCI in elderly patients with acute coronary syndrome

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Abstract: Objective: To investigate the characteristics of reperfusion arrhythmia during direct percutaneous coronary intervention (PCI) in elderly patients with acute coronary syndrome (ACS) and its impact on prognosis. Methods: A total of 286 elderly ACS patients admitted to Kweichow Moutai Hospital from January 2019 to February 2023 were included in this retrospective study, with 200 patients used for model development and 86 for validation. Patients were selected based on predefined inclusion and exclusion criteria applied to existing medical records. Data were retrospectively collected, including demographics (age, gender, BMI), clinical history (smoking, alcohol use, hypertension, diabetes), laboratory results (white blood cell count [WBC], hemoglobin [Hb], high-sensitivity C-reactive protein [hs-CRP]), imaging parameters (left atrial diameter [LA], left ventricular end-systolic diameter [LVESD], left ventricular end-diastolic diameter [LVEDD], and left ventricular ejection fraction [LVEF]), and PCI-specific details (time from symptom onset to PCI, pre-infarction angina, and TIMI grade). Statistical analysis was performed to identify risk factors for reperfusion arrhythmia during PCI in elderly ACS patients, and a prediction model was constructed and evaluated for its accuracy. Results: The prevalence of reperfusion arrhythmia in the model group was 74%. Risk factors for post-PCI reperfusion arrhythmia included multivessel disease, presence of pre-infarction angina, preprocedural TIMI grade 0 flow, and shorter time from onset to PCI. A predictive model was developed using the number of vascular lesions, presence of pre-infarction angina, TIMI grade, and time from onset to PCI, and visualized with a nomogram, showing a C-index of 0.841. The calibration curves indicated good agreement between observed and predicted outcomes, while Decision Curve Analysis (DCA) demonstrated a standardized net benefit for risk thresholds above 0.05. Validation with an independent dataset yielded an ROC AUC of 0.837, a Hosmer-Lemeshow goodness-of-fit test χ^2 value of 4.280 ($P = 0.747$), with a specificity of 90.62% and a sensitivity of 68.18%. Conclusion: Elderly ACS patients with multivessel disease, pre-infarction angina, preprocedural TIMI grade 0 flow, and shorter time from symptom onset to PCI are at higher risk of reperfusion arrhythmia during PCI. Early identification and preventive strategies should be implemented to improve patient prognosis.

Keywords: Elderly acute coronary syndrome, percutaneous coronary intervention, reperfusion arrhythmia, predictive model

Introduction

Atherosclerosis is the most common type of arteriosclerosis, and the aging population and rising prevalence of metabolic diseases are significant factors contributing to the increasing burden of coronary heart disease prevention and control [1-4]. The pathophysiology involves the adhesion and deposition of lipid-like substances on the arterial endothelium, accumulation of complex sugars, the formation of vascular plaques, fibrous tissue proliferation, and calcification, accompanied by medial arterial lesions. Rupture or erosion of these plaques can lead to thrombosis, significantly increasing the risk of acute coronary syndrome (ACS) [5-8]. The main symptoms of ACS include dyspnea, profuse sweating, and chest pain, characterized by rapid onset, fast progression, and high mortality rates, posing a serious threat to patient lives [9, 10].

Percutaneous coronary intervention (PCI) is an effective treatment for revascularizing occlud-

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ed vessels and improving cardiac function, making it one of the primary therapeutic approaches for ACS [11, 12]. However, post-PCI patients with ACS are at a higher risk of developing reperfusion arrhythmias, which increase the likelihood of reinfarction or even fatal outcomes [13, 14]. For high-risk ACS patients, a loading dose of Rosuvastatin administered prophylactically before PCI has been shown to reduce the risk of reperfusion arrhythmias [15]. It has been reported that the occurrence of reperfusion arrhythmias during PCI in myocardial infarction patients is influenced by the number of affected vessels, the infarct site, and other factors [16]. Additionally, the plasma atherogenic index is a significant predictor of adverse outcomes in ACS patients undergoing PCI with low-density lipoprotein cholesterol (LDL-C) levels below 1.8 mmol/L [17]. The non-HDL-C/HDL-C ratio also serves as an effective predictor of nonculprit coronary lesion progression in ACS patients undergoing PCI [18]. Preoperative serum levels of HIF-1α and VEGF are recognized as risk factors for developing reperfusion arrhythmias post-PCI in ACS patients [19].

Therefore, identifying preoperative risk factors for reperfusion arrhythmias during PCI is crucial for guiding preventive measures and clinical interventions. In this study, we retrospectively analyzed clinical data from elderly ACS patients, developed a predictive model for intraoperative reperfusion arrhythmias, and validated its clinical value. This study introduces a novel predictive model that integrates multiple risk factors to accurately assess the risk of reperfusion arrhythmias during PCI in elderly atherosclerosis patients. Unlike previous studies that focused on individual risk factors, our model provides a comprehensive risk assessment tool and demonstrates robustness through validation with an independent patient dataset. Moreover, the study specifically addresses elderly patients, filling a critical gap in the literature, and employs advanced statistical methods, including nomogram construction and Decision Curve Analysis (DCA), to enhance clinical utility. These innovations aim to improve clinical decision-making and patient outcomes by offering a reliable tool for assessing the risk of reperfusion arrhythmias during PCI.

Materials and methods

General information

A total of 286 elderly patients with acute coronary syndromes (ACS) admitted to Kweichow Moutai Hospital between January 2019 and February 2023 were retrospectively analyzed. Of these, 70% (n = 200) were randomly assigned to the modeling group, which was further divided into the reperfusion arrhythmia group (RA group, n = 148) and the no reperfusion arrhythmia group (NRA group, n = 52) based on the presence or absence of intraoperative reperfusion arrhythmias. The remaining 30% (n = 86) constituted the external validation group (see **Figures 1** and **2** for the case inclusion process).

Inclusion criteria: (1) Patients meeting the diagnostic criteria for ACS [20]. (2) Undergoing first-time PCI. (3) Age ≥ 60 years. (4) Availability of complete clinical, laboratory, and imaging data.

Exclusion criteria: (1) History of old myocardial infarction. (2) Presence of infectious or inflammatory diseases. (3) Presence of malignant tumors. (4) History of arrhythmic episodes prior to PCI. (5) Coexisting cardiac diseases, such as myocarditis or valvular heart disease.

This study was approved by the Ethics Committee of Kweichow Moutai Hospital.

Methods

Sample size calculation (Cross-Validation): When establishing a prediction model, it is recommended that the sample size should be 5 to 10 times the total number of factors to be analyzed. In this study, the anticipated number of factors to be included in the model is approximately 31. Based on a minimum requirement of 5 times the number of factors, at least 155 patients who developed the outcome should be enrolled. Given an expected reperfusion arrhythmia incidence of 50-75%, a total sample size of 206 to 310 cases would be adequate. Following the inclusion and exclusion criteria, data from 286 cases were collected. Of these, 70% (n = 200) were randomly selected for model development, while the remaining 30% (n = 86) were used for model validation.

Clinical data collection: General demographic information was collected from patient medical

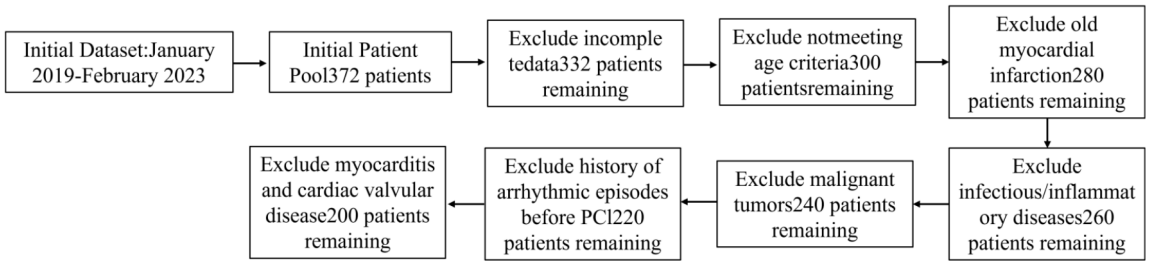

Figure 1. Initial Dataset case flowchart. PCI: Percutaneous Coronary Intervention.

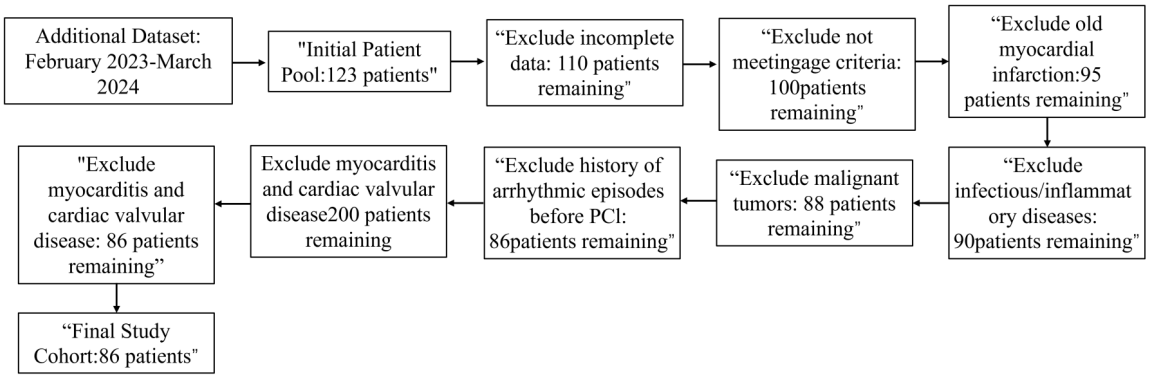

Figure 2. Additional Dataset case flowchart. PCI: Percutaneous Coronary Intervention.

records, including age, gender, BMI, history of smoking, alcohol abuse, hypertension, diabetes, coronary artery disease, number of vascular lesions, location of diseased vessels, pre-infarction angina, cardiogenic shock, and Thrombolysis in Myocardial Infarction (TIMI) classification.

Laboratory indices: White blood cell count (WBC), neutrophil count (N), hemoglobin (Hb), high-sensitivity C-reactive protein (hs-CRP), glucose (GLU), red blood cell distribution width (RDW), total cholesterol (TC), triglycerides (TG), uric acid (UA), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and creatine kinase-MB (CK-MB).

Imaging parameters: Left atrial diameter (LA), left ventricular end-systolic diameter (LVESD), left ventricular end-diastolic diameter (LVEDD), and left ventricular ejection fraction (LVEF).

Other indicators: Time from symptom onset to PCI, and time to surgery.

Definitions: Pre-infarction Angina: Typical chest pain occurring within three months prior to the onset of the disease.

Cardiogenic shock: Defined by a cardiac index < 2.2 L/(min·m^2), mean arterial pressure (MAP) < 65 mmHg or the need for vasoactive medications to maintain MAP > 65 mmHg, lactate > 4 mmol/L, and signs of oliguria and hypoperfusion.

TIMI classification: Grade 0 indicates no blood flow distal to the occluded vessel; grade I indicates that some contrast passes across the occlusion but fails to opacify the distal vessel completely.

Data extraction was conducted using electronic medical records and manual chart reviews by trained research personnel. All extracted data were cross-checked against original records and validated by an independent reviewer to ensure accuracy.

Outcome measures: The primary outcome was the occurrence of reperfusion arrhythmias during PCI. Secondary outcomes included the incidence of specific types of reperfusion arrhythmias and long-term clinical outcomes, such as mortality and major adverse cardiac events (MACE) during follow-up.

Evaluation of reperfusion arrhythmias: Reperfusion arrhythmias were diagnosed by the sudden onset of marked transient arrhythmias upon reperfusion of the coronary artery, follow-

Table 1. Comparison of baseline information between the two groups ($\bar{x}$ ± sd)

Data	Reperfusion arrhythmia group (n = 148)	Non-reperfusion arrhythmia group (n = 52)	$t/x^2/Z$	*P*
Age (years)	68.64±4.09	68.31±4.54	0.483	0.630
Gender [n (%)]			0.433	0.510
Male	79 (53.38)	25 (48.08)		
Female	69 (46.62)	27 (51.92)		
BMI (kg/m^2)	23.02±3.64	23.81±3.85	-1.330	0.185
Smoking history [n (%)]			0.975	0.324
Yes	94 (63.51)	29 (55.77)		
No	54 (36.49)	23 (44.23)		
Alcohol abuse history [n (%)]			1.259	0.262
Yes	76 (51.35)	22 (42.31)		
No	72 (48.65)	30 (57.69)		
Hypertension history [n (%)]			0.433	0.511
Yes	53 (35.81)	16 (30.77)		
No	95 (64.19)	36 (69.23)		
Diabetes mellitus history [n (%)]			2.222	0.136
Yes	86 (58.11)	24 (46.15)		
No	62 (41.89)	28 (53.85)		
Coronary heart disease history [n (%)]			0.449	0.503
Yes	59 (39.86)	18 (34.62)		
No	89 (60.14)	34 (65.38)		
Number of vascular lesions [n (%)]			19.378	< 0.001
Single	36 (24.32)	30 (57.69)		
Multiple	112 (75.68)	22 (42.31)		
Site of diseased vessels [n (%)]			0.358	0.836
Left anterior descending branch	36 (24.33)	14 (26.92)		
Left-hand branch	34 (22.97)	10 (19.23)		
Right coronary artery	78 (52.70)	28 (53.85)		
Preinfarction angina [n (%)]			8.609	0.004
Yes	86 (58.11)	18 (34.62)		
No	62 (41.89)	34 (65.38)		
Cardiogenic shock [n (%)]			0.137	0.712
Yes	67 (45.27)	22 (42.31)		
No	81 (54.73)	30 (57.69)		
TIMI classification [n (%)]			10.230	0.001
Grade 0	92 (62.16)	19 (36.54)		
Grade I	56 (37.84)	33 (63.46)		
WBC (×10^9/L)	12.35±4.27	11.73±4.56	0.775	0.439
N (×10^9/L)	9 (7, 12)	8 (6, 11.75)	-1.271	0.204
Hb (g/L)	135.55±25.82	138.62±28.65	-0.707	0.480
hs-CRP (mg/L)	12.28±4.20	11.68±5.06	0.692	0.490
GLU (mmol/L)	7.54±3.40	6.48±2.88	1.880	0.062
RDW	15.68±3.68	14.56±4.67	1.624	0.109
UA (umol/L)	360.50±66.84	354.84±46.45	0.573	0.567
TC (mmol/L)	4.46±1.06	4.58±1.25	-0.672	0.502
TG (mmol/L)	1.36±0.42	1.58±0.77	-1.967	0.054
HDL-C (mmol/L)	1.08±0.40	1.09±0.51	-0.112	0.911

LDL-C (mmol/L)	2.86±0.94	2.99±0.98	-0.851	0.396
CK-MB (U/L)	225.97±80.42	218.27±72.87	0.608	0.544
LA (mm)	36.05±8.62	36.71±8.96	-0.473	0.637
LVS (mm)	36.20±7.45	37.58±8.61	-1.103	0.271
LVD (mm)	50.80±8.62	51.50±6.98	-0.529	0.597
LVEF	0.46±0.28	0.54±0.36	-1.529	0.131
Time from onset to PCI (h)	6 (4.5, 8)	4 (3, 6)	-4.860	< 0.001
Surgical time (h)	2 (1, 2)	1.5 (1, 2)	-1.431	0.152

BMI: Body Mass Index; WBC: White Blood Cell Count; N: Neutrophil Count; Hb: Hemoglobin; hs-CRP: High-sensitivity C-reactive Protein; GLU: Glucose; RDW: Red Blood Cell Distribution Width; UA: Uric Acid; TC: Total Cholesterol; TG: Triglycerides; HDL-C: High-Density Lipoprotein Cholesterol; LDL-C: Low-Density Lipoprotein Cholesterol; CK-MB: Creatine Kinase-MB; LA: Left Atrial Diameter; LVS: Left Ventricular End-Systolic Diameter; LVD: Left Ventricular End-Diastolic Diameter; LVEF: Left Ventricular Ejection Fraction; PCI: Percutaneous Coronary Intervention; TIMI: Thrombolysis in Myocardial Infarction.

Table 2. Logistic regression analysis of reperfusion arrhythmias during PCI in elderly patients with acute coronary syndrome

Data	β	SE	Wald	P	OR	95% CI
Number of vascular lesions	1.367	0.407	11.273	0.001	3.924	1.767-8.717
Pre-infarction angina	0.837	0.399	4.403	0.036	2.310	1.057-5.049
TIMI classification	1.206	0.405	8.853	0.003	3.341	1.509-7.395
Time from onset to PCI	-0.622	0.134	21.416	< 0.001	0.537	0.413-0.699

OR: Odds Ratio; CI: Confidence Interval; SE: Standard Error; Wald: Wald Test Statistic; β: Regression Coefficient; TIMI: Thrombolysis in Myocardial Infarction; PCI: Percutaneous Coronary Intervention.

ing balloon dilatation or guidewire passage through the occluded vessel during direct PCI.

Statistical analysis

Statistical analyses were performed using SPSS version 22.0. The Shapiro-Wilk test was used to assess the normality of data distribution. Normally distributed data were expressed as mean ± standard deviation ($\bar{x}$ ± sd) and compared between groups using independent t-tests. Categorical data were expressed as rates (%) and analyzed using the chi-square (χ^2) test. ROC analysis for continuous variables with significant univariate results was performed using MedCalc software. Logistic regression was used to analyze influencing factors. Model construction and internal validation were conducted using R software. Model performance was evaluated by the area under the ROC curve (AUC) and the Hosmer-Lemeshow goodness-of-fit test, with statistical significance set at $P < 0.05$.

Results

Comparison of baseline data

There were no statistically significant differences between the two groups in terms of age, gender, BMI, or other clinical parameters (all $P > 0.05$). However, patients in the reperfusion arrhythmia group had a higher prevalence of multivessel disease, a greater incidence of pre-infarction angina, a higher proportion of TIMI grade 0 flow, and a shorter time from symptom onset to PCI compared to the non-reperfusion arrhythmia group (all $P < 0.05$), as shown in **Table 1**.

Binary logistic regression analysis

The number of vascular lesions, pre-infarction angina, TIMI grade, and time from symptom onset to PCI were identified as significant predictors ($P < 0.05$) of reperfusion arrhythmias during PCI in elderly patients with acute coronary syndrome, as presented in **Table 2**.

Construction of a predictive model for reperfusion arrhythmias during PCI

A predictive Nomogram model was constructed using the number of vascular lesions, pre-infarction angina, TIMI classification, and time from symptom onset to PCI as predictors, as shown in **Figure 3**.

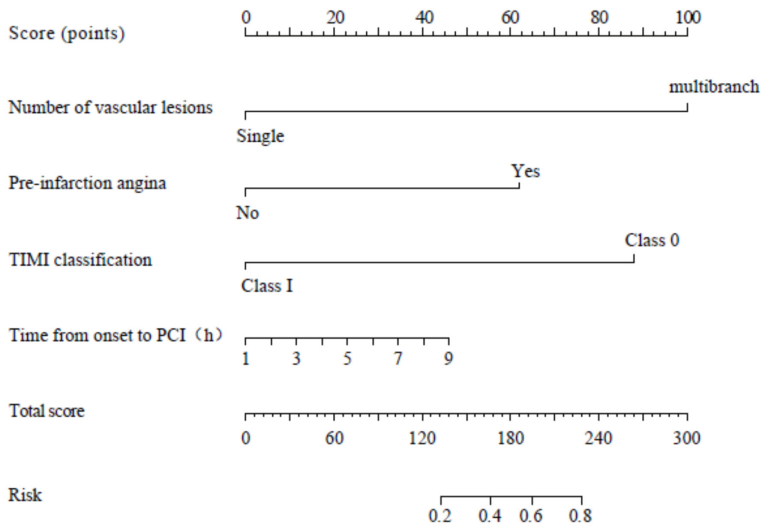

Figure 3. Nomogram model for predicting intraoperative reperfusion arrhythmias in patients undergoing PCI. PCI: Percutaneous Coronary Intervention; TIMI: Thrombolysis in Myocardial Infarction.

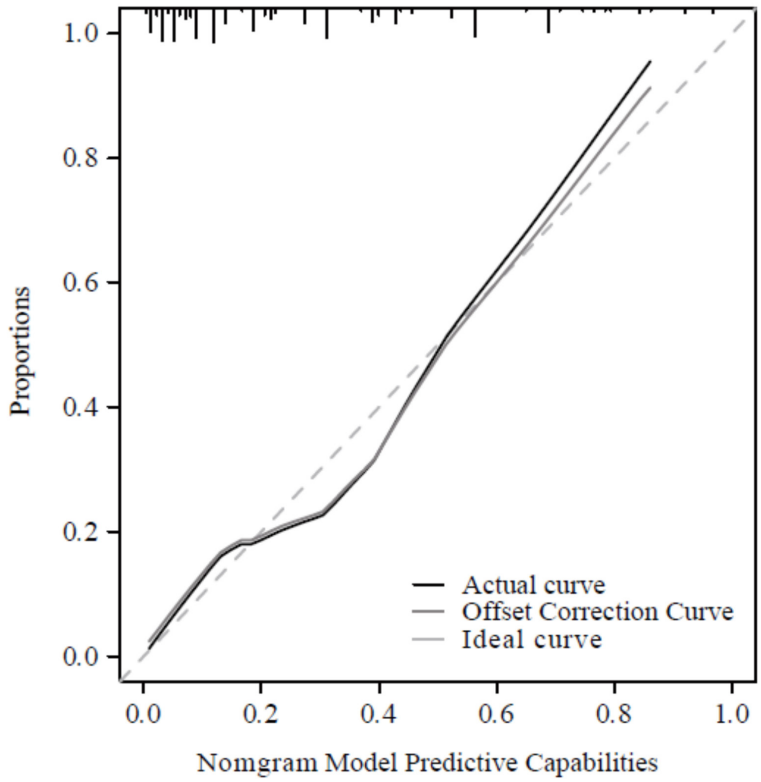

Figure 4. Calibration curve.

Nomogram model calibration and decision curve analysis (DCA)

The Nomogram model demonstrated excellent performance for predicting the risk of intraoperative reperfusion arrhythmias, with a C-index of 0.841 (95% CI: 0.779-0.904). The calibration curves showed good agreement between observed and predicted outcomes, as illustrated in **Figure 4**. The DCA indicated that the model provided a substantial standardized net benefit when the risk threshold was greater than 0.05, outperforming other variables included in the study, as depicted in **Figure 5**.

Predictive model validation

No significant differences (all $P > 0.05$) were found between the clinical characteristics of the two groups in the model-testing set, as shown in **Table 3**. The variables from the model-testing group were applied to the predictive model established using the modeling group data, and the risk of reperfusion arrhythmia was calculated. The ROC curve analysis demonstrated an AUC of 0.837 (95% CI: 0.742-0.908), as shown in **Figure 6**. The Hosmer-Lemeshow goodness-of-fit test yielded a χ^2 value of 4.280 with $P = 0.747$ ($P > 0.05$), indicating good model discrimination and calibration. The model achieved a specificity of 90.62% and a sensitivity of 68.18%, suggesting that it can accurately predict the occurrence of intraoperative reperfusion arrhythmias in elderly post-PCI patients.

Discussion

Arrhythmia is one of the most severe complications of acute myocardial infarction, and various serious reperfusion arrhythmias, such as accelerated idioventricular rhythm, ventricular tachycardia, atrioventricular block, bundle-branch block, sinoatrial block, and transient sinus bradycardia, are frequently observed dur-

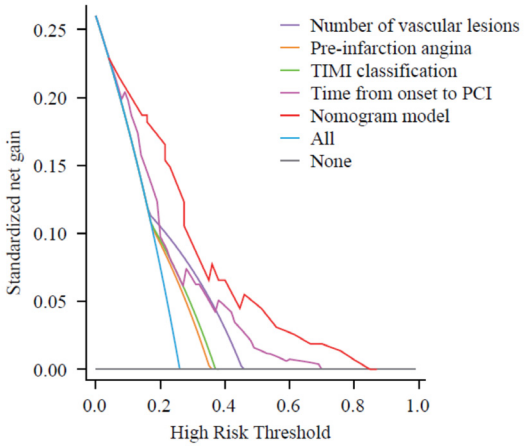

Figure 5. Decision curve. PCI: Percutaneous Coronary Intervention; TIMI: Thrombolysis in Myocardial Infarction.

ing direct PCI therapy [21-24]. The mechanism of reperfusion arrhythmias is thought to involve a massive influx of calcium ions into the cells following PCI, leading to mitochondrial calcium overload. This disrupts the electro-mechanical coupling of myocardial contractions, causing intense contraction of ischemic myocardial regions, microvascular spasm, increased vascular resistance, and impaired myocardial blood supply, ultimately resulting in arrhythmias [25, 26]. Additionally, excess oxygen free radicals generated during reperfusion may contribute to arrhythmia development. While these free radicals can rapidly restore the action potential of ischemic myocardium, the inconsistency in action potentials between the ischemic and border zones leads to myocardial fiber fibrillation, triggering arrhythmias [27-29]. Reperfusion arrhythmias can have serious consequences, including disturbances in electrical activity and hemodynamics, manifested as severe chest pain, hypotension, and even death [30, 31].

In this study, reperfusion arrhythmias occurred in 148 out of 200 elderly patients with acute coronary syndrome undergoing direct PCI in the modeling group, with a prevalence of 74%. Factors associated with reperfusion arrhythmias included multivessel disease, presence of pre-infarction angina, pre-procedural TIMI grade 0, and shorter time from symptom onset to PCI.

The incidence of reperfusion arrhythmia was 24.32% in patients with single-vessel lesions and 75.68% in those with multivessel lesions. This may be attributed to the higher likelihood of ischemic symptoms and greater collateral circulation development in patients with two- or three-vessel disease compared to those with single-vessel disease, providing a certain degree of ischemic preconditioning. The incidence of reperfusion arrhythmia was 58.11% in patients with right coronary artery infarction, higher than that in those with left anterior descending artery (24.33%) or left circumflex artery infarction (22.97%). This could be due to the sinoatrial and atrioventricular nodes receiving blood supply from the right coronary artery, which has a rich vagal innervation, making it more susceptible to bradycardia or hypotension through the Bezold-Jarisch reflex, leading to arrhythmias [32]. Patients with right coronary artery lesions often present with subtle clinical symptoms, higher collateral circulation patency, and full utilization of cardiac functional reserves to maintain myocardial perfusion during progressive occlusion. This results in a reduced ability to tolerate PCI events and difficulty in hemodynamic recovery. Conversely, patients with subtotal occlusion of infarcted vessels experience a smaller extent of myocardial ischemia, less myocardial damage, and a significantly lower incidence of reperfusion arrhythmia compared to those with complete occlusion [33].

In conclusion, timely reperfusion of occluded vessels remains the most effective treatment for acute coronary syndromes, but it also carries a high risk of reperfusion arrhythmias. Reducing the incidence and severity of reperfusion arrhythmias is a critical area for further research. In elderly patients with acute coronary syndromes undergoing direct PCI, reperfusion arrhythmias are closely associated with factors such as the number of vascular lesions, pre-infarction angina, TIMI grade, and time from onset to PCI, and they hold predictive value for the occurrence of reperfusion arrhythmias during PCI. Early detection and management of reperfusion arrhythmias are essential to mitigate reperfusion injury, reduce adverse events, and improve patient outcomes.

Disclosure of conflict of interest

None.

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Table 3. Comparison of clinical data between model and validation groups

Data	Model group (n = 200)	Validation group (n = 86)	$t/x^2/Z$	*P*
Age (years)	68.55±4.20	68.19±4.07	0.678	0.498
Gender [n (%)]			0.053	0.817
Male	104 (52.00)	46 (53.49)		
Female	96 (48.00)	40 (46.51)		
BMI (kg/m^2)	23.23±3.70	23.25±3.54	-0.047	0.963
Smoking history [n (%)]			0.042	0.837
Yes	123 (61.50)	54 (62.79)		
No	77 (38.50)	32 (37.21)		
Alcohol abuse history [n (%)]			0.024	0.877
Yes	98 (49.00)	43 (50.00)		
No	102 (51.00)	43 (50.00)		
Hypertension history [n (%)]			0.260	0.610
Yes	69 (34.50)	27 (31.40)		
No	131 (65.50)	59 (68.60)		
Diabetes mellitus history [n (%)]			0.173	0.677
Yes	110 (55.00)	45 (52.33)		
No	90 (45.00)	41 (47.67)		
Coronary heart disease history [n (%)]			0.154	0.695
Yes	77 (38.50)	31 (36.05)		
No	123 (61.50)	55 (63.95)		
Number of vascular lesions [n (%)]			0.096	0.757
Single	66 (33.00)	30 (34.88)		
Multiple	134 (67.00)	56 (65.12)		
Site of diseased vessels [n (%)]			0.013	0.993
Left anterior descending branch	50 (25.00)	22 (25.58)		
Left-hand branch	44 (22.00)	19 (22.09)		
Right coronary artery	106 (53.00)	45 (52.33)		
Preinfarction angina [n (%)]			0.017	0.897
Yes	104 (52.00)	44 (51.16)		
No	96 (48.00)	42 (48.84)		
Cardiogenic shock [n (%)]			0.053	0.818
Yes	89 (44.50)	37 (43.02)		
No	111 (55.50)	49 (56.98)		
TIMI classification [n (%)]			0.018	0.895
Grade 0	111 (55.50)	47 (54.65)		
Grade I	89 (44.50)	39 (45.35)		
WBC ($\times 10^9/L$)	12.19±4.34	11.95±4.03	0.432	0.666
N ($\times 10^9/L$)	12 (10, 14.75)	12 (9, 15)	-0.316	0.752
Hb (g/L)	136.35±26.55	136.33±26.23	0.006	0.995
hs-CRP (mg/L)	12.12±4.44	11.90±4.21	0.401	0.689
GLU (mmol/L)	7.26±3.30	7.04±3.21	0.531	0.596
RDW	15.39±3.98	15.15±4.61	0.446	0.656
UA (umol/L)	359.03±62.13	356.35±65.54	0.328	0.743
TC (mmol/L)	4.49±1.11	4.23±1.01	1.892	0.059
TG (mmol/L)	1.42±0.54	1.45±0.73	-0.327	0.744
HDL-C (mmol/L)	1.0±0.43	1.12±0.51	-0.601	0.549
LDL-C (mmol/L)	2.89±0.95	2.94±0.99	-0.363	0.717

CK-MB (U/L)	223.97±78.42	2258.07±80.65	-0.108	0.914
LA (mm)	36.22±8.69	36.76±9.08	-0.472	0.638
LVS (mm)	36.56±7.77	37.19±9.06	-0.598	0.550
LVD (mm)	50.98±8.22	52.05±9.68	-0.893	0.374
LVEF	0.46 (0.33, 0.62)	0.46 (0.24, 0.77)	-0.894	0.372
Time from onset to PCI (h)	6 (4, 7)	6 (4, 7)	-0.949	0.342
Surgical time (h)	23 (1, 2)	2 (1, 2)	-1.260	0.208

BMI: Body Mass Index; TIMI: Thrombolysis in Myocardial Infarction; WBC: White Blood Cell Count; Hb: Hemoglobin; hs-CRP: High-sensitivity C-reactive Protein; GLU: Glucose; UA: Uric Acid; TC: Total Cholesterol; TG: Triglycerides; HDL-C: High-Density Lipoprotein Cholesterol; LDL-C: Low-Density Lipoprotein Cholesterol; CK-MB: Creatine Kinase-MB; LA: Left Atrial Diameter; LVS: Left Ventricular End-Systolic Diameter; LVD: Left Ventricular End-Diastolic Diameter; LVEF: Left Ventricular Ejection Fraction; PCI: Percutaneous Coronary Intervention.

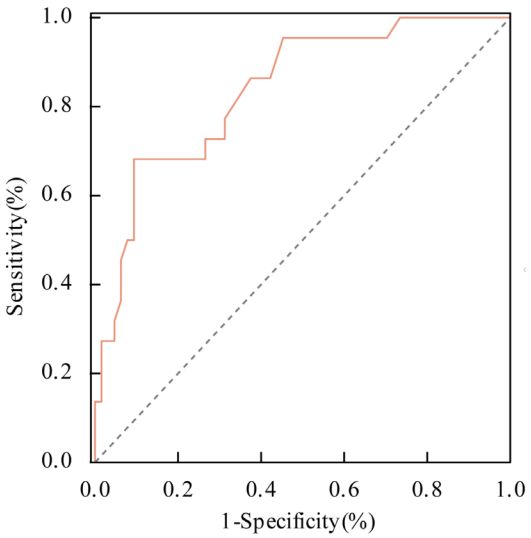

Figure 6. ROC curve analysis of the predictive model for intraoperative reperfusion arrhythmias among post-PCI patients in the validation group. PCI: Percutaneous Coronary Intervention.

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