论著·临床医学

持续静脉应用尼可地尔对急性ST段抬高型心肌梗死后室性心律失常的影响:一项随机对照研究

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[摘要] **目的** 探讨围术期持续静脉应用尼可地尔对急性ST段抬高型心肌梗死(ST-segment-elevation myocardial infarction, STEMI)后室性心律失常(ventricular arrhythmia, VA)的影响。**方法** 本研究为一项随机对照试验,纳入2024年1月至2025年5月我院心血管内科收治的行急诊经皮冠状动脉介入治疗(percutaneous coronary intervention, PCI)的STEMI患者140例,采用随机数表法将患者分为对照组(n=70)和尼可地尔组(n=70),尼可地尔组于急诊PCI术前静脉推注6 mg尼可地尔作为负荷剂量,继之以6 mg/h的速度持续静脉滴注48 h;对照组给予生理盐水,用法用量与尼可地尔组一致。比较两组住院期间VA(包括频发性室性早搏、非持续性室性心动过速、持续性室性心动过速、心室扑动及心室颤动)及主要不良心血管事件(major adverse cardiovascular events, MACE)的发生情况。**结果** 尼可地尔组VA的总体发生率显著低于对照组(31.4% *vs* 58.6%, P=0.001);尼可地尔组MACE的发生率较对照组略低,但差异无统计学意义(15.7% *vs* 27.1%, P=0.099)。多因素Logistic回归分析显示,尼可地尔是VA发生的独立保护因素(OR=0.205, 95%CI: 0.083~0.506, P=0.001)。亚组分析提示,尼可地尔的保护作用在年龄<65岁、无糖尿病及Killip I级的患者中尤为显著。**结论** 在STEMI常规治疗方案基础上,于PCI围术期持续静脉应用尼可地尔可有效降低住院期间室性心律失常的发生率。

[关键词] 尼可地尔;急性ST段抬高型心肌梗死;室性心律失常

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Effect of continuous intravenous injection of nicorandil on ventricular arrhythmias after acute ST-segment elevation myocardial infarction: A randomized controlled trial

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[**Abstract**] Objective To investigate the effect of continuous intravenous nicorandil administration during the perioperative period on ventricular arrhythmia (VA) in patients with acute ST-segment elevation myocardial infarction (STEMI). Methods A randomized controlled trial was conducted on 140 patients with acute STEMI undergoing emergency percutaneous coronary intervention (PCI) in our department from January 2024 to May 2025. They were randomly allocated into a control group (n=70) and a nicorandil group (n=70). The nicorandil group received an intravenous bolus of 6 mg nicorandil as a loading dose before emergency PCI, followed by a continuous intravenous infusion at 6 mg/h for 48 h. The control group received normal

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saline following the same dosage and administration schedule. The incidences of in-hospital VA (including frequent ventricular premature beats, non-sustained ventricular tachycardia, sustained ventricular tachycardia, ventricular flutter, and ventricular fibrillation) and major adverse cardiovascular events (MACE) were compared between the 2 groups. **Results** The total incidence of VA (31.4% *vs* 58.6%, *P*=0.001) was significantly lower in the nicorandil group than in the control group. The incidence of MACE was slightly lower in the nicorandil group compared to the control group, but the difference did not reach statistical significance (15.7% *vs* 27.1%, *P*=0.099). Multivariate logistic regression analysis indicated that nicorandil was an independent protective factor against VA (*OR*=0.205, 95% *CI*: 0.083~0.506, *P*=0.001). Subgroup analysis suggested that the protective effect of nicorandil was particularly significant in patients aged <65 years, without diabetes, and with Killip class I. **Conclusion** Based on conventional STEMI treatment regimen, continuous intravenous administration of nicorandil during the peri-PCI period effectively reduces the incidence of in-hospital VA.

[**Key words**] nicorandil; acute ST-segment elevation myocardial infarction; ventricular arrhythmia

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急性ST段抬高型心肌梗死(ST-segment-elevation myocardial infarction, STEMI)是冠状动脉急性缺血、缺氧导致的局部心肌坏死,可引起心律失常、心力衰竭等并发症,是心血管疾病中常见的急危重症[1]。其中,室性心律失常(ventricular arrhythmia, VA)是STEMI最常见的并发症之一,也是导致患者死亡或猝死的最常见原因[2]。目前,STEMI后VA的确切病理生理机制尚未完全阐明,现有证据表明其发生与缺血介导的触发活动、梗死区域的结构重构以及电重构等机制相关[3-4]。尼可地尔是一种具有多重药理作用机制的药物,其硝酸酯样作用可通过扩张冠状动脉及容量血管,降低心脏前后负荷,改善心肌微循环,缩小心肌梗死范围[5-6]。此外,尼可地尔可选择性开放ATP敏感性钾通道,促进钾离子外流,缩短动作电位时程,减少钙内流,从而降低心律失常的发生风险[6-7]。有研究报道,在STEMI患者急诊经皮冠状动脉介入治疗(percutaneous coronary intervention, PCI)围术期使用尼可地尔,能改善慢血流/无复流、提高左心室射血分数、缩小梗死面积、降低心律失常的发生率并降低不良心血管事件[8-10]。然而,既往研究多局限于急诊PCI术前静脉注射或术中冠状动脉内注射尼可地尔对再灌注心律失常的观察性分析[11-12],鉴于持续输注尼可地尔可能具有的药代动力学优势,关于急诊PCI围术期持续静脉应用该药物对STEMI患者VA影响的系统性研究仍显不足,亟待进一步研究。基于此,本研究拟探讨在常规STEMI治疗基础上,联合持续静脉应用尼可地尔对VA的影响,以期为临床治疗提供参考。

1 资料与方法

1.1 研究对象

本研究为随机对照试验,纳入2024年1月至2025年5月在我院心血管内科行急诊PCI的STEMI患者。纳入标准:①年龄18~80岁;②未使用抗心律失常药物;③发病12 h内临床确诊为STEMI拟行急诊PCI,诊断符合《急性ST段抬高型心肌梗死诊断和治疗指南(2019)》[13];④自愿参加研究并签署知情同意书。排除标准:①收缩压<100 mmHg;②心源性休克;③合并主动脉夹层;④除本次以外6个月内发生过心肌梗死或接受血运重建;⑤正在口服尼可地尔;⑥对尼可地尔过敏或有禁忌证;⑦严重肾功能不全(估算肾小球滤过率eGFR <30 L/min/1.73 m^2)、严重肝功能不全(Child-Pugh分级B级或C级)、严重脑功能障碍(严重痴呆、生活不能自理等);⑧右室心肌梗死;⑨闭角型青光眼;⑩对硝酸盐及亚硝酸脂类药物过敏;⑪近3个月内参加其他临床试验;⑫妊娠期或哺乳期妇女;⑬不同意参加或未签署知情同意书。

共纳入140例STEMI患者,采用随机数字表法分为对照组和尼可地尔组,每组70例。两组基线资料比较差异无统计学意义(P>0.05),具有可比性(表1)。所有患者及家属均知情同意,本研究经我院伦理委员会批准[2024年伦审第(65)号],并在中国临床试验注册中心注册(编号:ChiCTR2500104685)。

1.2 试验设计

本研究为前瞻性、随机、双盲、安慰剂平行对照试验。

1.2.1 样本量估算 根据预实验结果,急性STEMI患者住院期间VA发生率约为61%,使用静脉尼可地尔后降至31%。设α=0.05(双侧检验),β=0.1,利用PASS 15.0软件估算,每组需53例,考虑20%脱落率,每组至少64例,共128例。本研究最终纳入140例,所有患者数据均纳入分析。

1.2.2 盲法设计与实施 本研究采用随机数字表法结合分配隐藏:由不参与研究流程的科研助理生成140个分配序号,对应"对照组"或"尼可地尔组",分组结果密封于不透光的信封。患者签署知情同意书后,由护士按序拆封执行分组。尼可地尔与生理盐水由药房统一配制,使用相同规格的输液装置,药液的外观无差异;患者、医护人员及结局评估者均对分组不知情,直至数据锁定后揭盲。

1.3 用药方法

所有患者均按照《急性ST段抬高型心肌梗死诊断和治疗指南(2019)》[13]行急诊PCI术及常规用药方案,根据患者的不同情况,使用抗血小板、抗凝、他汀类、硝酸酯类、钙拮抗剂、ACEI/ARB/ARNI、β受体阻滞剂等药物。尼可地尔组于PCI术前静脉推注6 mg尼可地尔(北京四环科宝制药有限公司,国药准字H20120069)作为负荷剂量,继之以6 mg/h的速度持续静脉滴注48 h;对照组给予生理盐水,用法用量与尼可地尔组一致。

1.4 观察指标

1.4.1 室性心律失常发生情况 采用BeneVision中心监护系统(深圳迈瑞)及遥测移动多参数监护系统(型号:NS-YC-B,重庆新标)持续监测入组患者住院期间(平均7天)的心电信号,记录VA发生情况,包括频发室性早搏(>30次/h)、非持续性室性心动过速(持续时间<30 s)、持续性室性心动过速(持续时间≥30 s或因血流动力学不稳定需紧急终止)、心室扑动和心室颤动等,监护系统上出现频发室性早搏等心律失常时必要时行床旁心电图或动态心电图确认。VA诊断由2名不知情的心电图专科医生共同确认,诊断标准参照《2020室性心律失常中国专家共识》[14]。

1.4.2 主要不良心血管事件(major adverse cardiovascular events, MACE) 记录住院期间MACE,包括心血管死亡、心肌再梗死、急性左心衰竭(Killip分级≥Ⅱ级或需要静脉应用利尿剂、血管扩张剂或正性肌力药物)和脑卒中,事件由2名不知情的副主任医师共同判定。

1.5 统计学分析

应用SPSS 25.0统计分析软件对数据进行处理,计量资料用均数±标准差($\bar{x}\pm s$)或中位数(四分位数间距)[$M(P_{25},P_{75})$]表示,组间比较采用t检验或Mann-Whitney U检验;计数资料用例数和百分比表示,组间比较采用χ^2检验或Fisher精确概率法。采用Logistic回归模型分析尼可地尔与VA的关系,计算OR值及95%CI。P<0.05为差异有统计学意义。

2 结果

2.1 两组患者基线资料比较

尼可地尔组和对照组在性别、吸烟、体重指数、高血压、糖尿病、术前Killip分级、入院时血压、心率、左心室舒张末期内径、左心室射血分数、冠状动脉病变支数、支架植入数、梗死部位、血脂、血K^+及临床用药等方面比较,差异均无统计学意义(均P>0.05,表1)。

2.2 两组患者住院期间室性心律失常的比较

两组患者住院期间VA总发生率差异有统计学意义(P<0.05),尼可地尔组VA的发生率约为31.4%,显著低于对照组的58.6%(χ^2=10.418,P=0.001)。进一步亚组分析显示,尼可地尔组频发室性早搏、非持续性室性心动过速发生率均显著低于对照组(均P<0.05)。尼可地尔组致命性VA(包括持续性室速、室扑/室颤)发生率有低于对照组的趋势(5.7% *vs* 12.9%,P=0.145),但差异未达统计学意义(表2)。

2.3 尼可地尔对降低STEMI患者VA风险的多因素logistic回归分析及亚组分析

多因素Logistic回归分析显示,尼可地尔是VA的独立保护因素(OR=0.205,95%CI:0.083~0.506,P=0.001),保护效应为79.5%。Killip Ⅰ级患者VA风险低于≥Ⅱ级者(OR=0.106,P<0.001),多支血管病变是VA的独立危险因素(OR=4.160,P=0.007)(表3)。

为探讨尼可地尔在不同特征患者中的疗效,我们进行了预设的亚组分析。结果显示:尼可地尔对VA的总体保护作用显著(OR=0.322,95%CI:0.163~0.654,P=0.001),且在年龄<65岁(OR=0.136,P<0.001)、无糖尿病(OR=0.213,P<0.001)、Killip Ⅰ级(OR=0.160,P<0.001)及无多支血管病变(OR=0.075,P=0.016)的患者中效益更为突出,与年龄存在显著交互作用(交互作用P=0.027)(图1)。

2.4 两组患者MACE发生情况比较

尼可地尔组MACE发生率低于对照组(15.7% *vs* 27.1%),但差异无统计学意义(χ^2=2.715,P=0.099)。两组在心血管死亡、心肌再梗死、急性左心衰竭、脑卒中发生率方面比较,差异均无统计学意义(均P>0.05)(表4)。

表1 两组STEMI患者临床基线资料比较[$\bar{x}\pm s$, n(%)]

Table 1 Comparison of clinical baseline data between the 2 groups[$\bar{x}\pm s$, n(%)]

Item	Nicorandil group (n=70)	Control group (n=70)	t/Z value	P value
Age (years)	63.84±12.90	62.07±13.57	0.640	0.522
Gender (male/female)	59/11	60/10	0.056	0.813
BMI, kg/m^2	23.97±2.79	24.16±3.15	0.374	0.709
Smoking	47(67.1)	45(64.2)	0.127	0.722
Hypertension	38(54.3)	39(55.7)	0.029	0.865
Diabetes	22(31.4)	20(28.5)	0.136	0.712
Onset to reperfusion, h	5(3.5,7.7)	5(3.1,6.1)	1.396	0.163
SBP at admission (mmHg)	126.80±20.15	124.80±16.31	0.027	0.978
DBP at admission (mmHg)	79.53±15.98	75.66±12.57	1.594	0.113
Heart rate at admission (beat/min)	78.29±16.05	81.04±16.26	0.640	0.522
LVEDD (mm)	46.56±5.57	47.27±5.08	0.879	0.379
LVEF (%)	54.79±8.77	53.57±8.76	0.688	0.491
CAG			0.302	0.583
Single-vessel disease	20(28.6)	23(32.9)		
Multi-vessel disease	50(71.4)	47(67.1)		
Thrombus aspiration	5(7.1)	7(10.0)	0.365	0.546
Number of stents implanted	1.08±0.81	1.07±0.71	0.140	0.889
Infarct location			0.030	0.862
Anterior wall	44(62.8)	43(61.4)		
Inferior wall	26(37.1)	27(38.6)		
Killip classification			0.507	0.476
I	48(68.6)	44(62.9)		
⩾ II	22(31.4)	26(37.1)		
TC (mmol/L)	4.81±1.09	4.85±1.29	0.819	0.413
TG (mmol/L)	2.31±1.79	2.40±2.80	1.217	0.224
HDL-C (mmol/L)	1.19±0.35	1.16±0.30	0.438	0.662
LDL-C (mmol/L)	3.08±0.98	3.11±0.98	0.153	0.879
K+(mmol/L)	3.82±0.37	3.82±0.36	0.023	0.982
Aspirin	70(100)	70(100)	-	-
Ticagrelor	56(80.0)	54(77.1)	0.170	0.680
Clopidogrel	14(20.0)	16(22.9)	0.170	0.680
Statins	70(100)	70(100)	-	-
PCSK9 inhibitor/Inclisiran	37(52.3)	35(50.0)	0.114	0.735
Nitrates	18(25.7)	16(22.8)	0.155	0.693
β-blockers	40(57.1)	38(54.3)	0.116	0.734
ACEI/ARB/ARNI	26(37.1)	27(38.6)	0.030	0.862
Calcium channel blockers	11(15.7)	12(17.1)	0.052	0.820

BMI: Body mass index; SBP: Systolic blood pressure; DBP: Diastolic blood pressure; LVEDD: Left ventricular end-diastolic dimension; LVEF: Left ventricular ejection fraction; CAG: coronary angiography; TC: Total cholesterol; TG: Triglycerides; HDL-C: High-density lipoprotein cholesterol; LDL-C: Low-density lipoprotein cholesterol; PCSK9: Proprotein convertase subtilisin/kexin type 9; ACEI: Angiotensin-converting enzyme inhibitor; ARB: Angiotensin II receptor blocker; ARNI: Angiotensin receptor-neprilysin inhibitor

2.5 尼可地尔组不良反应发生情况

尼可地尔组共7例(10.0%)患者出现不良反应,其中头痛4例(5.7%),均为一过性轻度头痛,未停药;低血压3例(4.3%),收缩压降至90~95 mmHg,无头晕、黑矇等症状,经减慢输液速度后血压回升,未中断治疗。无皮疹、面部潮红等其他不良反应。

表2 两组STEMI患者住院VA发生情况比较[n;百分率(%)]

Table 2 Comparison of in-hospital VA occurrence between the 2 groups [n; percent(%)]

Group	n	Total VA	FVPBs	NSVT	Sustained VT	VFL/VF	Life-threatening VA (Sustained VT/VFL/VF)
Control group	70	41(58.6)	27(38.6)	13(18.6)	6(8.6)	4(5.7)	9(12.9)
Nicorandil group	70	22(31.4)[a]	16(22.9)[a]	5(7.1)[a]	2(2.9)	2(2.9)	4(5.7)
χ^2	-	10.418	4.061	4.080	2.106	0.692	2.120
P value	-	0.001	0.044	0.043	0.275	0.681	0.145

VA: Ventricular arrhythmia; FVPBs: Frequent ventricular premature beats; NSVT: Non-sustained ventricular tachycardia; VT: Ventricular tachycardia; VF: Ventricular fibrillation; VFL: Ventricular flutter. a: P<0.05, compared with the control group

表3 STEMI患者室性心律失常的多因素logistic回归分析

Table 3 Results of multivariate logistic regression analysis

Variables	β	SE	Wald χ^2	P value	OR value	95%CI
Control group *vs* Nicorandil group	−1.584	0.461	11.812	0.001	0.205	0.083~0.506
Age	0.013	0.019	0.476	0.490	1.013	0.977~1.050
Gender (Male *vs* Female)	0.288	0.755	0.146	0.703	1.334	0.304~5.861
BMI	0.019	0.078	0.058	0.810	1.019	0.874~1.188
K^+	0.475	0.610	0.607	0.436	1.608	0.487~5.310
Killip classification (I *vs* ≥II)	−2.246	0.499	20.266	<0.001	0.106	0.040~0.281
Smoking	0.247	0.550	0.201	0.654	1.280	0.436~3.760
Diabetes	−0.717	0.487	2.172	0.141	0.488	0.188~1.267
Hypertension	−0.017	0.478	0.001	0.971	0.983	0.385~2.509
Multi-vessel disease	1.426	0.531	7.199	0.007	4.160	1.468~11.786
Heart rate	0.220	0.014	2.412	0.120	1.022	0.994~1.051
LVEF	−0.037	0.024	2.350	0.125	0.963	0.918~1.010
Number of stents implanted	0.004	0.299	0.000	0.989	1.004	0.559~1.803
LDL-C	0.264	0.234	1.273	0.259	1.301	0.823~2.057
Ticagrelor	0.819	0.601	1.858	0.173	2.268	0.699~7.360
β-blockers	−0.204	0.443	0.212	0.646	0.816	0.342~1.945
ACEI/ARB/ARNI	−0.751	0.521	2.081	0.149	0.472	0.170~1.309
Nitrates	−0.582	0.504	1.333	0.248	0.559	0.208~1.501
Intercept	−2.958	3.450	0.735	0.391	0.052	-

SE: Standard error; BMI: Body mass index; LVEF: Left ventricular ejection fraction; LDL-C: Low-density lipoprotein cholesterol; ACEI: Angiotensin-converting enzyme inhibitor; ARB: Angiotensin II receptor blocker; ARNI: Angiotensin receptor-neprilysin inhibitor

3 讨论

STEMI发病率在全球范围内仍呈上升趋势,尽管急诊PCI已成为标准治疗,其死亡率仍居高不下[15]。VA是STEMI最常见的并发症之一,也是导致患者死亡或猝死的最常见原因之一[2,16]。研究表明,STEMI后VA最常发生于患者发病后的48小时内,总体发生率可达20%~40%,其中危及生命的室速/室颤约占8%,严重影响患者预后[2,13,17-18],因此,早期预防和治疗STEMI后VA具有重要临床意义。

尼可地尔作为目前唯一作用于三磷酸腺苷敏感型钾离子通道(KATP通道)开放剂,既可开放血管平滑肌上的KATP通道有效扩张冠脉微血管,增加缺血区的血氧供应;又能开放心肌线粒体膜上的KATP通道,模拟缺血预适应,稳定电活动,减少缺血损伤及心律失常[5-7]。然而,既往的研究多集中于急诊PCI术前静脉注射或术中冠状动脉内单次给药,其对长期微循环及电活动稳定的影响尚不明确[12]。本研究首次探讨持续静脉应用尼可地尔对STEMI患者VA的预防作用。

本研究发现,在STEMI常规治疗基础上,围术期持续静脉应用尼可地尔可显著降低住院期间VA发生

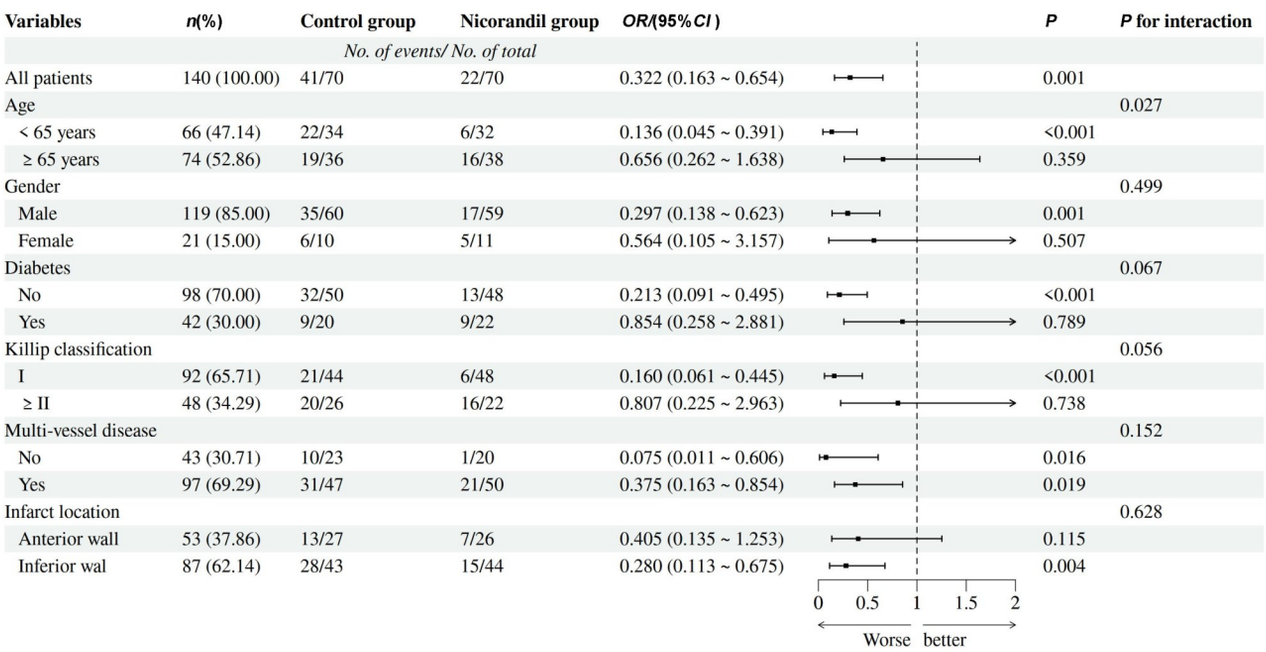


图1 尼可地尔降低VA风险的亚组分析

Figure 1 Subgroup analysis of nicorandil in reducing VA risk

表4 两组STEMI患者住院期间MACE发生情况比较[n;百分率(%)]

Table 4 Comparison of in-hospital MACE between the 2 groups[n; percent(%)]

Group	n	MACE	Cardiovascular death	Myocardial reinfarction	Acute left heart failure	Strok
Control group	70	19(27.1)	3(4.3)	2(2.9)	13(18.6)	1(1.4)
Nicorandil group	70	11(15.7)	2(2.9)	1(1.4)	7(10.0)	1(1.4)
χ^2	-	2.715	0.206	0.338	2.100	0.000
P value	-	0.099	1.000	1.000	0.147	1.000

MACE: Major adverse cardiovascular events

率,尤其是频发室性早搏和非持续性室速,致命性VA亦有下降趋势。该结果提示,持续静脉应用尼可地尔或可为STEMI患者PCI后VA预防提供新策略。尼可地尔改善或预防心肌梗死后VA发生的作用可能源于其抗心律失常的双重作用机制:①开放KATP通道,促进K^+外流,缩短动作电位平台期,抑制Ca^{2+}内流,缩短动作电位时程及QT间期;②硝酸酯样作用,扩张冠脉,改善微循环,减轻内皮损伤及心肌纤维化,减少与缺血相关的VA[5,7,19-20]。在一项纳入3 646例STEMI患者的Meta分析显示,急诊PCI术中或术后应用尼可地尔可显著降低VA发生风险,与本研究结论一致,其潜在机制可能与尼可地尔改善心肌微循环灌注、稳定心肌电活动的双重作用密切相关[5]。另一项RCT显示,术中冠脉内注射尼可地尔可显著降低术后24小时恶性VA发生率,其获益同样源于其扩张微血管与调节心肌电生理的双重药理机制,与本研究发现相印证[11]。

本研究未发现尼可地尔对MACE的显著改善作用,但观察到下降趋势(P=0.099),与Tariq H、Ishii H及Lu Y等的研究结果不一致[8-9,21],分析可能原因在于:首先,本研究的样本量是基于VA发生率进行估算的,对于发生率较低的MACE终点而言统计效能不足,可能导致Ⅱ类错误。其次,尽管本研究对结局评估者实施了盲法,但MACE中对急性心力衰竭的判断仍可能存在一定主观性,存在潜在评估偏倚的风险。最后,差异还可能源于研究人群、给药方案的不同及随访时间。本研究采用持续静脉输注48小时的给药策略,弹丸式注射剂量也偏小,且仅记录住院期间MACE发生,随访时间短,长期随访可能更易检测出MACE的差异。未来需更大样本、更长随访研究进行

进一步验证。

本研究还通过多因素Logistic回归分析评估了尼可地尔对VA发生风险的影响,结果证实,尼可地尔是VA的独立保护因素,且保护作用在调整多种混杂因素后依然显著。Killip分级高、多支血管病变均增加VA风险,提示心功能恶化及严重缺血可促进VA发生,而尼可地尔的心肌保护作用可能部分抵消此类风险,与GENG等[22]的研究一致。

亚组分析显示,尼可地尔预防STEMI患者VA的疗效存在显著的异质性,这为其在临床实践中的精准应用提供了关键发现。在年龄<65岁、无糖尿病、Killip Ⅰ级及无多支血管病变患者中保护作用最强,且与年龄存在交互作用。推测该类患者心肌结构及微血管相对完好,尼可地尔改善灌注、减轻氧化应激及缺血再灌注损伤的效应更易发挥。反之,高龄、合并症多、心功能差者,心肌坏死及微血管病变严重,可能削弱其单药疗效。提示临床中应对相对年轻、无严重合并症、心功能良好者积极考虑使用尼可地尔,而对复杂高危患者需采取更多的综合管理策略。

本研究有以下局限性,其一,本研究为单中心设计,样本量相对有限,可能存在选择偏倚。尤其亚组中女性样本量小,导致检验效能不足;其二,本研究未探讨不同剂量及给药方案的疗效,缺乏剂量-效应关系数据;其三,本研随访时间短,未能评估长期预后及MACE差异。未来需开展多中心、大样本、长期随访研究,并结合药代动力学分析进一步验证尼可地尔的疗效与安全性。

综上所述,在STEMI常规治疗方案基础上,PCI围手术期持续静脉应用尼可地尔可有效地降低住院期间VA发生率,具有一定的临床参考价值。鉴于其独特的双重作用机制,尼可地尔有望成为抑制心肌梗死后VA的新型治疗选择。

利益冲突 本文所有作者声明不存在利益冲突

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