

Correlation of Systolic Blood Pressure With the Improvement of Acute Coronary Syndrome Patients Admitted in the Emergency Department: A Retrospective Cohort Study

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Abstract

Background:

Blood pressure affects the clinical outcome of acute coronary syndrome (ACS) patients. However, it is not clear what level of blood pressure is beneficial to the improvement of ACS patients in emergency department. The purpose of this study is to analyze the impact of systolic blood pressure (SBP) on ACS patients' improvement and transfer of patient from emergency department

Methods:

A total of 2667 patients who were admitted to the Emergency Department of Chest Pain Center, Fujian Provincial Hospital due to chest pain from January 1, 2017 to March 31, 2020 were included in the study. Logistic regression was used to analyze the correlation between SBP and ACS patients' improvement in the emergency department, and the predictive effect on the disease improvement was evaluated. The study also analyzed the impact of SBP on the improvement of different subgroups of patients in the emergency department.

Results:

In total, 592 (22.20%) out of 2667 patients were improved and transferred to the general ward. Multivariate logistic regression analysis found that SBP = 120–140 mmHg (OR = 0.700; 95% CI: 0.510–0.961; $P = 0.027$) was an independent predictor for the decreased likelihood of improvement of ACS patients from the emergency department; SBP > 140 mmHg (OR = 1.348; 95% CI: 1.000–1.817; $P = 0.049$), use of clopidogrel (OR = 1.924; 95% CI: 1.247–2.971; $P = 0.003$), non-ST-segment elevation myocardial infarction (NSTEMI) (OR = 2.683; 95% CI: 1.645–4.375; $P < 0.001$) and unstable angina (OR = 23.654; 95% CI: 15.415–36.297; $P < 0.001$) were all independent predictors for the increased likelihood of improvement of ACS patients in the emergency department. The area under curve (AUC) of the predictive efficacy of SBP, combined with ticagrelor, NSTEMI and unstable angina (UA) was 0.814 (95% CI: 0.795–0.833, $P < 0.001$).

Conclusion:

The study found that SBP = 120–140 mmHg was an independent predictor for the decreased likelihood of improvement of ACS patients from the emergency department, but SBP > 140 mmHg was an independent predictor for the increased likelihood of improvement of ACS patients. This correlation may be useful for doctors to make clinical decisions for ACS patients.

Introduction

Acute coronary syndrome (ACS), including unstable angina (UA), non-ST segment elevation myocardial infarction (NSTEMI), and ST-segmental elevation infarction (STEMI), is the leading cause of mortality and disability¹⁻³. Although the mortality rate of ACS has greatly declined⁴, it is still estimated that 40% of patients with coronary events will die within 5 years, and the mortality risk in patients with recurrent events is five to six times higher^{5,6}. The overall trend of acute myocardial infarction mortality was on the rise from 2002 to 2015 and began to rise rapidly in 2005 in China⁷.

Many factors affect the clinical outcome of ACS patients. A previous study found that age, use of diuretics at admission, type 1 diabetes, serum creatinine level, lower systolic blood pressure (SBP), STEMI and NSTEMI categories are associated with higher mortality risk in ACS patients⁸. A retrospective study found that age, Killip class, SBP, ST-segment deviation, cardiac arrest during presentation, serum creatinine level, positive initial cardiac enzyme findings, and heart rate accounted for 89.9% of the prognostic information of ACS patients with and without ST-segment elevation⁹. Blood pressure is a key determinant of adverse events in patients with cardiovascular disease¹⁰. In the case of acute cardiovascular disease (including ACS), SBP is a powerful predictor of mortality risk^{9,11}. Another study found that there was a significant correlation between the blood pressure of ACS patients on admission and the prognosis of the patients¹². The results of the PRavastatin OR atorVastatin Evaluation and Infection Therapy-Thrombolysis In Myocardial Infarction (PROVE IT-TIMI) 22 trial showed that after the occurrence of ACS, there was a J-shaped or U-shaped curve correlation between blood pressure and the risk of future cardiovascular events. The lowest event rates were found in SBP range of 130 to 140 mmHg, and the diastolic blood pressure (DBP) range of about 80 to 90 mmHg. With an SBP of 110 to 130 mmHg and a DBP of 70 to 90 mmHg, patients may be at higher risk for cardiovascular events¹³.

Therefore, identifying the risk factors related to the clinical outcome of ACS patients has substantial clinical significance in reducing mortality and improving the clinical outcome of ACS patients. Many previous studies focused on the analysis of the impact of SBP on the mortality of ACS patients; however, there are few clinical studies on the impact of SBP on ACS patients' improvement in the emergency department (ED). This study aimed to analyze the impact of SBP on ACS patients' improvement in the emergency department and evaluate the impact of SBP on outcome indicators in different subgroups of ACS patients.

Methods

Participants and study design

From January 1, 2017 to March 31, 2020, a total of 2667 patients who were admitted to the Chest Pain Center (ED), Fujian Provincial Hospital due to chest pain were included in this retrospective cohort study. Research data were extracted from the hospital information system, laboratory information management system, clinical data repository, intensive care unit database of Fujian Provincial Hospital. Inclusion criteria were age ≥ 18 years and admission to the hospital with a diagnosis of ACS. Exclusion criteria

were pregnancy, patients with malignant tumors, end-stage renal disease, severe liver disease or hematological diseases, and patients with non-cardiogenic chest pain. All patients were divided into three groups according to different blood pressure levels, and the baseline characteristics were compared. The correlation between SBP and ACS patients' improvement in the ED was analyzed, and the predictive effect of these risk factors on the improvement was evaluated. The study also analyzed the impact of SBP on the improvement of patients in different subgroups. The study was approved by the Ethical Committee of Fujian Provincial Hospital.

Variables and definitions

The study variables included demographic characteristics, physical examination, laboratory testing, medications. ACS was defined according to the 2020 European Society of Cardiology (ESC) Guidelines. Patients who presented with acute chest pain accompanied by persistent (>20 minutes) elevation of the ST-segment were defined as ST-segment elevation ACS (STE-ACS). Patients with acute chest discomfort but no continuous ST-segment elevation in the electrocardiogram were defined as non-ST-segment elevation ACS (NSTEMI-ACS), which can manifest as ST-segment transient elevation, ST-segment persistent or transient depression, T-wave inversion, flat T waves, pseudo-normalization of T waves, or normal electrocardiography. UA is defined as myocardial ischemia at rest or on minimal exertion in the absence of acute cardiomyocyte injury/necrosis¹⁴.

ACS patient's improvement in the ED meant that the patient's symptoms were effectively relieved after treatment, and the patient was transferred to the general ward of cardiology department. Patients who were not improved in the ED included death, transferring to other departments, or transferring to other hospitals.

Statistical analysis

Numerical variables were summarized as median (IQR), and categorical variables were displayed by counts and percentages. Wilcoxon rank-sum test was applied for continuous variables to compare between groups. For categorical variables, the Chi-square test or Fisher's exact test was used for between groups comparison. Univariate logistic regression was applied first, and variables with $P < 0.10$ were analyzed further using multivariate logistic regression thereafter to evaluate the impact of SBP on the discharge from the ED, after being adjusted for confounding factors by using a stepwise selection method. In addition, the receive operating characteristic (ROC) curve was plotted combining the SBP and the adjusted confounders. The area under curve (AUC) (95% confidence interval) with P -value, sensitivity, and specificity were also calculated. Furthermore, each significant variable (i.e., $P < 0.05$) identified in univariate analysis was stratified, and subgroup analysis was conducted in each stratum subsequently. All statistical tests were two-sided, and $P < 0.05$ was regarded as statistically significant. The analyses were conducted using SPSS 22.0 (SPSS Inc., Chicago, IL).

Results

Patients' characteristics

The study included 2667 patients, of which 592 patients (22.20%) were improved and transferred to general ward while the remaining 2075 patients (77.80%) were not improved in the ED (Supplemental Table 1). All patients were divided into three groups according to different blood pressure levels: SBP <120 mmHg (n=604), $120 \leq \text{SBP} \leq 140$ mmHg (n=957), and SBP >140 mmHg (n=1106). The study compared the clinical characteristics of patients with different blood pressures categories.

Comparison of clinical characteristics of patients with different blood pressure categories

The clinical characteristics of patients with different blood pressure categories were compared. The results showed no significant difference between the use of aspirin and beta-blockers among patients belonging to different blood pressure categories, while there were significant differences in other variables among the three groups (Table 1).

Univariate and multivariate analysis of risk factors for ACS patients' improvement in the ED

The study used logistic regression analysis to analyze the factors affecting the improvement of ACS patients in the ED. Univariate analysis found that sex (OR=0.606; 95% CI: 0.501-0.733; $P < 0.001$), cardiac troponin I (cTnI) (OR=0.949; 95% CI: 0.924-0.976; $P < 0.001$), use of clopidogrel (OR=0.342; 95% CI: 0.229-0.511; $P < 0.001$) were significantly associated with decreased likelihood of improvement in patients with ACS. DBP (OR=1.076; 95% CI: 1.017-1.140; $P = 0.011$), use of ticagrelor (OR=2.444; 95% CI: 1.787-3.343; $P < 0.001$), use of statins (OR=1.972; 95% CI: 1.470-2.644; $P < 0.001$), NSTEMI (compared with STEMI) (OR=2.487; 95% CI: 1.603-3.858; $P < 0.001$), UA (compared with STEMI) (OR=19.786; 95% CI: 13.638-28.707; $P < 0.001$), and SBP >140 mmHg (compared with SBP <120 mmHg) (OR=1.813; 95% CI: 1.416-2.322; $P < 0.001$) were significantly associated with increased likelihood of ACS patients' improvement in the ED (Table 2).

After adjusting for confounding factors, the study found that SBP=120-140 mmHg (compared with SBP <120 mmHg) (OR=0.700; 95% CI: 0.510-0.961; $P = 0.027$) was significantly associated with decreased likelihood of improvement in patients with ACS. SBP >140 mmHg (compared with SBP <120 mmHg) (OR=1.348; 95% CI: 1.000-1.817; $P = 0.049$), use of clopidogrel (OR=1.924; 95% CI: 1.247-2.971; $P = 0.003$), NSTEMI (compared with STEMI) (OR=2.683; 95% CI: 1.645-4.375; $P < 0.001$) and UA (compared with STEMI) (OR=23.654; 95% CI: 15.415-36.297; $P < 0.001$) were significantly associated with increased likelihood of ACS patients' improvement in the ED (Table 2).

The ROC curve of SBP, combined with ticagrelor, NSTEMI, and UA for prediction of improvement of ACS patients in the ED

The study analyzed the predictive efficacy of SBP, combined with ticagrelor, NSTEMI, and UA in the improvement of ACS patients. The result showed that the AUC was 0.814 (95% CI: 0.795-0.833, $P < 0.001$), the sensitivity was 0.801, and the specificity was 0.738 (Figure 1).

The influence of different SBP groups on the improvement of ACS patients in the ED

The results showed that SBP >140 mmHg (compared with SBP <120 mmHg) was an independent predictor for improvement in several subgroups of ACS patients, including male, female, DBP <80 mmHg, cTnl ≤ 0.1 , none use of clopidogrel, ticagrelor, use of and non-use of statins and UA subgroups (Table 3). However, in not-use of statins subgroup, compared with SBP <120 mmHg, SBP=120-140 mmHg was significantly associated with improvement of ACS patient ($P=0.006$) (Table 3). No other significant association between SBP and improvement of ACS patient in the ED was detected.

Discussion

We analyzed the impact of SBP on ACS patients' improvement in the ED and evaluated its correlation with different subgroups of patients. The results showed that SBP=120-140 mmHg was an independent predictor for the decreased likelihood of improvement of ACS patients from the ED; SBP >140 mmHg, the use of ticagrelor, NSTEMI, and UA were significantly correlated with increased likelihood of ACS patients' improvement in the ED. The AUC of the predictive efficacy of SBP, combined with ticagrelor, NSTEMI, and UA for the ACS patients' improvement was 0.814 (95% CI: 0.795-0.833; $P<0.001$). To analyze the impact of SBP on improvement of different types of ACS population, we conducted a subgroup analysis. The results showed that the subgroups of males, females, DBP <80 mmHg, cTnl ≤ 0.1 , treated with clopidogrel, treated with ticagrelor, treated with and without statins, UA, and SBP ≥ 140 mmHg were significantly associated with the improvement of ACS patients in the ED. In subgroup analysis, SBP=120-140 mmHg was an independent predictor of ED improvement in ACS patients who did not receive statins.

Most previous studies focused on analyzing the impact of SBP on the risk of death in ACS patients. A retrospective clinical study found that lower SBP was independently associated with the mortality risk of patients with non-ST-elevation ACS¹⁵. Patients with SBP <110 mmHg had a significantly increased risk of 7-day and 1-year mortality and major adverse cardiovascular events, while patients with high SBP >140 mmHg presented with a lower risk of mortality and MACE¹⁶. Compared with the lowest blood pressure classification, patients in the highest blood pressure category (SBP was categorized as ≤ 120 mmHg, 121–140 mmHg, 141–160 mmHg, and ≥ 160 mmHg. DBP was categorized as < 60 mmHg, 61–80 mmHg, 81–85 mmHg, and >86 mmHg) have a relative 70% lower mortality risk¹⁷. A prospective clinical study in Korea found that STEMI patients with normal SBP (≥ 100 mmHg and ≤ 139 mmHg) have a higher risk of in-hospital mortality compared with higher SBP (≥ 140 mmHg)¹⁸. Several clinical studies have evaluated the impact of blood pressure on clinical outcomes in patients with ACS other than death. A retrospective cohort study found that, compared with those with normal blood pressure, those with elevated blood pressure during ED visits were associated with an increased risk of hospitalization due to heart failure¹⁹. Lower blood pressure in ACS patients was significantly associated with an increased risk of hospitalization for cardiovascular events²⁰. As far as we know, there is still a lack of research about the impact of SBP on ACS patients' improvement in the ED. This study aims to fill the gap in literature about the impact of SBP on ACS patients' improvement in the ED.

First, we analyzed the correlation between SBP and ACS patients' improvement in the ED and found that SBP=120-140 mmHg was an independent predictor of decreased chance of improvement in ED. In contrast, SBP>140 mmHg was significantly associated with an increased chance of improvement of ACS patients. Patients with higher blood pressure upon admission to the ED were more likely to be improved. It is possible that for this result may include: for patients with impaired coronary perfusion, lowering blood pressure may reduce blood flow to target organs²⁰. Hypotension may be associated with underlying chronic disease-related symptoms and increased morbidity and mortality. In addition, hypotension is a marker of cardiogenic shock and is associated with an increased risk of cardiovascular events²⁰. Patients with higher blood pressure may be more likely to be attended sooner by clinicians. Clinicians may then take some interventions to lower blood pressure, making it easier for these patients to be improved in the ED.

The Study of Platelet Inhibition and Patient Outcomes (PLATO) found that ticagrelor treatment for 12 months can significantly reduce the risk of myocardial infarction, stroke, and cardiovascular death in ACS patients²¹. Moreover, ticagrelor can effectively prevent new ischemic events and mortality in ACS patients, regardless of the presence of heart failure²². This is consistent with our research results. Our study also found that NSTEMI is an independent predictor of ACS patients' improvement in the ED. To the best of our knowledge, the clinical characteristics of STEMI patients are different from those of NSTEMI. Compared with STEMI, NSTEMI has better short-term outcomes²³⁻²⁵. Compared with STEMI and NSTEMI patients, UA patients have lower short-term mortality risk^{26,27}. Therefore, NSTEMI and UA patients may have better treatment outcomes and were therefore more likely to be improved in the ED and transferred to general ward. This was consistent with the results of this study, which showed that NSTEMI was an independent predictor of ACS patients' improvement in the ED.

The study also found that the AUC of SBP, combined with several other related variables for ACS patients' improvement in the ED was 0.814, the sensitivity was 0.801, and the specificity was 0.738. SBP, combined with other variables for the diagnosis of ACS patients, risk stratification and prediction of mortality risk has been confirmed by several studies^{11,28-30}. However, it is the first time that SBP was analyzed in combination with other related variables that predict ACS patients' improvement in the ED.

Subgroup analysis found that the subgroups of males, females, DBP <80 mmHg, cTnI ≤0.1, use of clopidogrel, use of ticagrelor, use/non-use of statins, UA, and SBP ≥140 mmHg were significantly associated with the improvement of ACS patients in the ED. In the subgroup that was not treated with statins, SBP=120-140 mmHg was also an independent predictor of an increased chance of improvement in the ED. The results of these subgroup analyses suggest that for ACS patients with different risks, SBP has different effects on patients' improvement in the ED.

The study had several limitations. First, this was a retrospective study; hence, the results need to be verified by a prospective clinical trial. Second, our study was a single-center study; therefore, the research results need to be further verified by multi-center clinical studies. Third, there was also a lack of clinical biochemical variables in the study, which could be further addressed in future research.

In conclusion, SBP=120-140 mmHg was an independent predictor for the decreased likelihood of improvement of ACS patients from the ED; SBP >140 mmHg, the use of ticagrelor and NSTEMI were significantly correlated with increased likelihood of ACS patients' improvement in the ED and transfer to general ward. SBP >140 mmHg was an independent predictor of improvement in most subgroups.

Declarations

Ethics approval and consent to participate

Our study was approved by the Ethical Committee of Fujian Provincial Hospital. The informed consent requirement was waived by the Ethical Committee of Fujian Provincial Hospital since the study only involved the use of past clinical data. All methods in our study were carried out in accordance with relevant guidelines and regulations.

Consent for publication

There are no details on individuals reported within the manuscript, consent for publication is not applicable in our study.

Availability of data and materials

All data generated or analysed during this study are included in this published article [and its supplementary information files].

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

J. K: responsible for research protocol, data collection and analysis

Y. C: responsible for statistical analysis of research data

X. W: responsible for data collection and data review, and final pooling of data

Z. W: responsible for retrieval and screening literature, writing research papers

Q. Z: responsible for supervising the implementation of research and data quality control

Y. L: responsible for data collection and data review

F. C: responsible for the determination of the research direction, the design of the research program

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Tables

Table 1
Comparison of clinical characteristics of patients with different blood pressure categories

Parameter		SBP < 120 mmHg (n = 604)	120 ≤ SBP ≤ 140 mmHg (n = 957)	SBP > 140 mmHg (n = 1106)	P value
Age	Median (IQR)	64 (54,73)	63 (54,73)	68 (59,76)	< 0.001
Breath rate	Median (IQR)	20 (19,20)	20 (19,20)	20 (19,20)	0.016
Pulse rate	Median (IQR)	79 (68,91)	78 (69,87)	80 (70,90)	0.007
SBP	Median (IQR)	107 (99,114)	130 (124,135)	157 (148,172)	< 0.001
DBP	Median (IQR)	69 (60,76)	78 (73,85)	88 (79,98)	< 0.001
cTnl	Median (IQR)	0.097 (0.01,1.5)	0.037 (0.01,0.85)	0.042 (0.01,0.59)	< 0.001
Gender	Female	152 (25.2%)	287 (30%)	396 (35.8%)	< 0.001
	Male	452 (74.8%)	670 (70%)	710 (64.2%)	
Aspirin	No	33 (5.5%)	42 (4.4%)	45 (4.1%)	0.405
	Yes	571 (94.5%)	915 (95.6%)	1061 (95.9%)	
Clopidogrel	No	531 (87.9%)	838 (87.6%)	1007 (91%)	0.022
	Yes	73 (12.1%)	119 (12.4%)	99 (9%)	
Ticagrelor	No	109 (18%)	163 (17%)	152 (13.7%)	0.03
	Yes	495 (82%)	794 (83%)	954 (86.3%)	
Statins	No	106 (17.5%)	178 (18.6%)	140 (12.7%)	< 0.001
	Yes	498 (82.5%)	779 (81.4%)	966 (87.3%)	

Note: SBP: Systolic blood pressure; DBP: Diastolic blood pressure; cTnl: Cardiac troponin I; ACS: Acute coronary syndrome

Parameter		SBP < 120 mmHg (n = 604)	120 ≤ SBP ≤ 140 mmHg (n = 957)	SBP > 140 mmHg (n = 1106)	P value
Beta blockers	No	593 (98.2%)	939 (98.1%)	1096 (99.1%)	0.11
	Yes	11 (1.8%)	18 (1.9%)	10 (0.9%)	
ACS category	STEMI	245 (40.6%)	302 (31.6%)	294 (26.6%)	< 0.001
	NSTEMI	168 (27.8%)	221 (23.1%)	303 (27.4%)	
	UA	191 (31.6%)	434 (45.4%)	509 (46%)	
Discharge from the emergency department	No	498 (82.5%)	779 (81.4%)	798 (72.2%)	< 0.001
	Yes	106 (17.5%)	178 (18.6%)	308 (27.8%)	

Note: SBP: Systolic blood pressure; DBP: Diastolic blood pressure; cTnI: Cardiac troponin I; ACS: Acute coronary syndrome

Table 2

Univariate and multivariate analysis of risk factors for ACS patients' improvement in the emergency department

Variables	Unadjusted			Adjusted		
	OR	95% CI	<i>P</i> value	OR	95% CI	<i>P</i> value
Gender (male vs female)	0.606	(0.501,0.733)	< 0.001			
Age (Unit = 1)	1.005	(0.998,1.012)	0.185			
Breath rate (Unit = 1)	0.987	(0.957,1.017)	0.386			
Pulse rate (Unit = 1)	0.997	(0.993,1.002)	0.291			
DBP: Unit = 10	1.076	(1.017,1.140)	0.011			
cTnl: Unit = 1	0.949	(0.924,0.976)	< 0.001			
Aspirin (Yes vs No)	1.649	(0.99,2.744)	0.055			
Clopidogrel (Yes vs No)	0.342	(0.229,0.511)	< 0.001			
Ticagrelor (Yes vs No)	2.444	(1.787,3.343)	< 0.001	1.924	(1.247,2.971)	0.003
Statins (Yes vs No)	1.972	(1.470,2.644)	< 0.001			
Beta blockers (Yes vs No)	0.511	(0.199,1.313)	0.163			
<i>ACS category</i>	2.487	(1.603,3.858)	< 0.001	2.683	(1.645,4.375)	< 0.001
NSTEMI vs STEMI						
UA vs STEMI	19.786	(13.638,28.707)	< 0.001	23.654	(15.415,36.297)	< 0.001
<i>SBP category (mmHg)</i>	1.073	(0.823,1.4)	0.601	0.700	(0.510,0.961)	0.027
120–140 vs < 120						

Note: SBP: Systolic blood pressure; DBP: Diastolic blood pressure; cTnl: Cardiac troponin I; ACS: Acute coronary syndrome

	Unadjusted			Adjusted		
>140 vs < 120	1.813	(1.416,2.322)	< 0.001	1.348	(1.000,1.817)	0.0499
Note: SBP: Systolic blood pressure; DBP: Diastolic blood pressure; cTnl: Cardiac troponin I; ACS: Acute coronary syndrome						

Table 3
The influence of different SBP subgroups on the improvement of ACS patients in the emergency department

Variable	Group	SBP	OR	95% CI	P
Gender	Male	120–140 vs < 120	0.911	(0.662,1.255)	0.569
		> 140 vs < 120	1.51	(1.12,2.035)	0.007
	Female	120–140 vs < 120	1.456	(0.892,2.376)	0.133
		> 140 vs < 120	2.369	(1.497,3.749)	< 0.001
DBP	DBP < 80	120–140 vs < 120	1.194	(0.869,1.641)	0.273
		> 140 vs < 120	2.217	(1.577,3.117)	< 0.001
	80 ≤ DBP < 90	120–140 vs < 120	0.875	(0.486,1.577)	0.657
		> 140 vs < 120	1.595	(0.899,2.829)	0.11
	DBP ≥ 90	120–140 vs < 120	0.433	(0.104,1.811)	0.252
		> 140 vs < 120	0.973	(0.259,3.653)	0.968
cTnI	cTnI ≤ 0.1	120–140 vs < 120	0.965	(0.694,1.34)	0.83
		> 140 vs < 120	1.62	(1.187,2.211)	0.002
	cTnI > 0.1	120–140 vs < 120	0.874	(0.472,1.618)	0.668
		> 140 vs < 120	1.673	(0.97,2.885)	0.064
Clopidogrel	Yes	120–140 vs < 120	1.057	(0.396,2.821)	0.911
		> 140 vs < 120	0.943	(0.334,2.661)	0.911
	No	120–140 vs < 120	1.078	(0.817,1.421)	0.596
		> 140 vs < 120	1.843	(1.425,2.382)	< 0.001
Ticagrelor	Yes	120–140 vs < 120	1.016	(0.765,1.349)	0.911
		> 140 vs < 120	1.824	(1.404,2.371)	< 0.001
	No	120–140 vs < 120	1.544	(0.701,3.404)	0.281
		> 140 vs < 120	1.246	(0.547,2.838)	0.6
Statins	Yes	120–140 vs < 120	0.93	(0.701,1.233)	0.613
		> 140 vs < 120	1.637	(1.264,2.12)	< 0.001
	No	120–140 vs < 120	3.932	(1.472,10.498)	0.006

Note: DBP: Diastolic blood pressure; cTnI: Cardiac troponin I; ACS: Acute coronary syndrome

Variable	Group	SBP	OR	95% CI	P
		> 140 vs < 120	4.179	(1.538,11.358)	0.005
ACS category	STEMI	120–140 vs < 120	1.057	(0.455,2.454)	0.897
		> 140 vs < 120	0.742	(0.297,1.857)	0.524
	NSTEMI	120–140 vs < 120	0.744	(0.345,1.606)	0.451
		> 140 vs < 120	1.39	(0.724,2.672)	0.323
	UA	120–140 vs < 120	0.709	(0.501,1.004)	0.053
		> 140 vs < 120	1.444	(1.033,2.018)	0.032

Note: DBP: Diastolic blood pressure; cTnI: Cardiac troponin I; ACS: Acute coronary syndrome

Figures

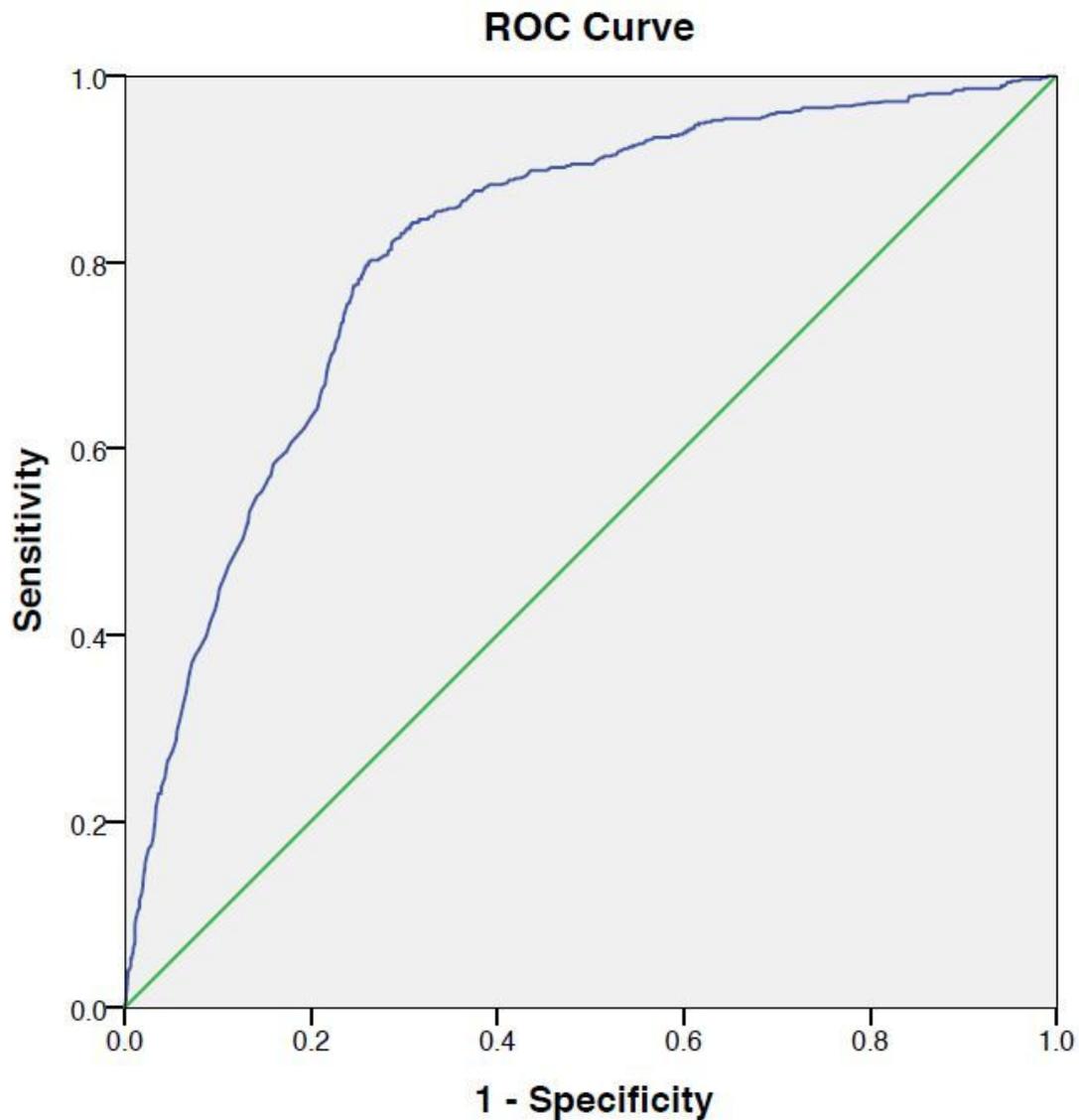


Figure 1

The ROC curve of SBP, combined with ticagrelor, NSTEMI and UA for prediction of ACS patients' improvement in the ED Note: The AUC was 0.814 (95% CI: 0.795-0.833, $P < 0.001$), the sensitivity was 0.801, and the specificity was 0.738. ROC: receive operating characteristic; SBP: systolic blood pressure; NSTEMI: non-ST-segment elevation myocardial infarction; ACS: acute coronary syndrome; AUC: area under curve

Supplementary Files

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- [SupplementalTable.docx](#)