ARAŞTIRMA MAKALESİ / *RESEARCH ARTICLE*

Evaluation of Time to Reach Primary Percutaneous Coronary Intervention in Patients with ST-Segment Elevation Myocardial Infarction Presenting to the Emergency Department

Acil Servise Başvuran ST Segment Elevasyonlu Miyokart İnfaktüslü Hastaların Primer Perkütan Koroner Girişime Ulaşma Sürelerinin Değerlendirilmesi

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ABSTRACT

Aim: *There are strong recommendations regarding the duration of the primary percutaneous coronary intervention (PCI) in ST-segment elevation myocardial infarction (STEMI) patients admitted to the emergency department (ED). Determining these periods in local sources is important in comparing their compliance with current diagnosis and treatment guidelines and their effects on morbidity-mortality.*

Material and Method: *Patients with STEMI who applied to the ED of a tertiary education and research hospital between 01.10.2017 and 01.10.2019, accompanied by the prehospital health system or outpatient, were included in this single-center retrospective study. The time to reach PCI and the effects on mortality and morbidity were evaluated in patients diagnosed with STEMI in the ED or referred from an external center with the diagnosis of STEMI.*

Results: *233 patients were included in the study. The mean age of the patients in the study was 61.84±11.70, and 19.31% were female. The time to reach PCI was 55.55±45.08 minutes in patients admitted directly to our hospital by ambulance, 68.27±57.15 minutes in outpatients, and 30.54±27.39 minutes in patients referred from another hospital, which was significantly different (p<0.001). There was no significant difference between patients with and without complications in terms of arrival time to PCI (medians were 37 vs 42, p=0.054). There was no significant difference between the cases with a mortal course and the cases without mortality in terms of the time of arrival to PCI (medians were 37 vs 43, p=0.914).*

Conclusion: *Although the times seem to be compatible with current guidelines, the situations that increase the average need to be revealed. In particular, it is necessary to take measures to limit the time to reach PCI for outpatients. In this study, although the time to reach PCI complies with current guidelines, it shows that other regulations are needed to reduce STEMI-related mortality.*

Key words: *ST-segment elevation myocardial infarction; primary percutaneous coronary intervention; emergency department*

ÖZET

Amaç: *Acil servise başvuran ST segment yükselmeli miyokart infarktüsü (STEMI) hastalarında primer perkütan koroner girişim (PCI) süresi konusunda güçlü öneriler mevcuttur. Bu sürelerin yerel kaynaklardaki tayini, güncel tanı ve tedavi rehberlerine uygunluğunun ve morbidite-mortalite üzerine etkilerinin karşılaştırılması açısından önemlidir.*

Materyal ve Metot: *Bu tek merkezli retrospektif çalışmaya 3. basamak eğitim araştırma hastanesi acil servisine 01.10.2017 ile 01.10.2019 tarihleri arasında hastane öncesi sağlık sistemi eşliğinde ya da ayaktan başvuran STEMI'lü hastalar dahil edildi. Acil serviste STEMI tanısı konulan veya dış merkezden STMI tanısı alarak sevk ile gelen hastalar hastaların PCI'a ulaşma süreleri ve bu sürelerin mortalite ve morbiditeye etkileri değerlendirildi.*

Bulgular: *Çalışmaya 233 hasta dahil edildi. Araştırmadaki hastaların yaş ortalaması 61,84±11,70 ve %19,31'i kadındı. Ambulansla direkt hastanemize başvuran hastalarda PCI'e ulaşma süresi 55,55±45,08 dakika, ayaktan direkt başvuran hastalarda 68,27±57,15 dakika ve başka hastaneden sevk edilen hastalarda 30,54±27,39 dakika olup anlamlı olarak farklıydı (p<0,001). PCI'ya varış süresi açısından komplikasyon gelişen ve komplikasyon gelişmeyen hastalar arasında anlamlı bir fark yoktu (sırasıyla median 37 ve 42, p=0,054). Mortal seyreden vakalar ile mortalite gelişmeyen vakalar arasında PCI'ye varış zamanı açısından anlamlı bir fark bulunmadı (sırasıyla median 37 ve 43, p=0,914).*

Sonuç: *Her ne kadar süreler güncel klavuzlarla uyumlu görülmekte ise de, ortalamayı yükselten durumların açığa çıkarılması gerekmektedir. Özellikle ayaktan başvuran hastaların PCI'ya ulaşma sürelerini kısıtlayıcı önlemler alınması gerekmektedir. Bu çalışmada PCI'a ulaşma süreleri güncel klavuzlara uygunluk gösterse de STEMI'e bağlı mortaliteyi azaltmak açısından başka düzenlemelere ihtiyaç olduğunu göstermektedir.*

Anahtar kelimeler: *ST segment yükselmeli miyokart infarktüsü; primer perkütan koroner girişim; acil servis*

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Introduction

Acute coronary syndrome (ACS) refers to acute chest pain resulting from impaired myocardial blood flow or other symptoms of myocardial ischemia and electrocardiographic changes that usually accompany clinical presentations due to myocardial ischemia. ACS is a series of events associated with thrombotic coronary artery disease, including non-ST-segment elevation myocardial infarction (NSTEMI), ST-segment elevation myocardial infarction (STEMI), and sudden cardiac death[1].

One-third of deaths associated with myocardial infarction (MI) occur within the first few hours after the onset of symptoms[2]. Early application of the treatment, especially reperfusion therapy, in STEMI reduces mortality and morbidity. Reducing treatment delays increases survival, while delayed treatment results in irreversible myocardial damage and death[3].

Primary percutaneous coronary intervention (PCI) is the preferred reperfusion method in patients with STEMI. The American Heart Association (AHA) 2013 STEMI guidelines recommend that primary PCI be completed within 90 minutes for STEMI patients presenting to a hospital that can perform PCI[4].2017 European Society of Cardiology (ESC), in the STEMI Guidelines, the maximum time for electrocardiography (ECG) recording and diagnosis with first medical contact is 10 minutes, the time for PCI is 60 minutes if the patient applied to the center where the primary intervention was performed, and it was stated that it should not exceed a maximum of 120 minutes for patients who applied to the emergency department (ED) with the prehospital health system[5]. In the same guideline, the term 'time from diagnosis to PCI (wire crossing)' is used instead of the term 'door-to-balloon time' (D2B)[5]. In this study, we aim to determine the time to reach primary PCI in STEMI patients admitted to the ED, evaluate the compliance of this time with current diagnosis and treatment guidelines, and compare the effects of this time on morbidity and mortality.

Material and Methods

Our retrospective study is conducted with patients diagnosed with STEMI between 01.10.2017 and 01.10.2019 in the ED of a 3rd level education and research hospital, which 400.000 patients apply annually. This study was conducted with the approval of the local ethics committee numbered 2019/123.

Our study was conducted on patients over the age of 18. Patients brought to our study with the pre-hospital health system, outpatients, and referred from external centers were included. Patients with STEMI detected in the 12-lead ECG (presence of newly developed or newly developing left bundle branch block with ST-segment elevation of 0.20 mV in males, 0.15 mV in females or 0.1 mV and above in other leads in at least two adjacent leads V2 and V3 and posterior myocardial infarction) made up the study population. Patients diagnosed with STEMI in the ED and STEMI patients diagnosed with STEMI in an external center and admitted to our hospital by ambulance were retrospectively scanned using hospital records. Patients admitted to the ED are welcomed by the ED senior assistant and emergency medicine specialist. The first ECG took, patient complaints, the patient's history, and physical examination findings are recorded in the patient's file by the senior assistant. If deemed necessary, consultations of the patients to the relevant departments are made by the senior assistant and emergency medicine specialist through the hospital's electronic information system. In this study, the demographic characteristics of the patients, how long they were admitted to the hospital after admission, how long it took the patients to reach PCI, which coronary artery was treated in PCI were investigated using patient files and hospital records. Admission hours to our hospital and time to reach PCI were determined for patients referred from another hospital where PCI could not be performed. The time taken for admission and referral to the previous hospital was not included in the study. The time between admission to the hospital and admission to PCI was evaluated as the "Arrival to PCI" time. Mortality and morbidity of the patients included in the study within one month after PCI was evaluated by examining hospital records. The relationship between the patients' admission time to the ED and the time to reach PCI and the development of morbidity and mortality were investigated.

Statistical Analysis

All analyses were performed on SPSS v21 (SPSS Inc., Chicago, IL, USA). For the normality check, the Kolmogorov-Smirnov test was used. Data are given as mean ± standard deviation or median (1st quartile – third quartile) for continuous variables according to the normality of distribution and as frequency (percentage) for categorical variables. Normally distributed variables were analyzed with the analysis

of variances (ANOVA). Non-normally distributed variables were analyzed with the Mann Whitney U test or Kruskal Wallis test depending on the count of groups. Categorical variables were analyzed with the chi-square tests. Pairwise comparisons were performed with the Bonferroni correction method. Spearman correlation coefficients were calculated to evaluate relationships between continuous variables. Multiple logistic regression analyses (conditional forward method) were performed to determine risk factors of mortality. $p<0.05$ values accepted as statistically significant results.

Results

Our study included 233 patients (188 males and 45 females); the mean age was 61.84±11.70 (range 33–93). Median arrival to PCI time was 41 minutes. Arrival to PCI time was one hour or below in the 165 (70.82%) patients while above 2 hours in the 17 (7.30%) patients (Table 1). The number of patients whose first medical contact was our hospital was 163. Median arrival to PCI time for these patients was 52 (range 7 – 420) minutes (Table 2). Arrival to PCI time was 55.55±45.08 minutes in patients who first medical contact to our hospital by ambulance, 68.27±57.15 minutes in patients who visit directly, and 30.54±27.39 minutes in referred patients, significantly different ($p<0.001$) (Table 3).

Fifty (21.46%) patients had known coronary artery disease, 28 (12.02%) patients had a coronary stent, and 6 (2.58%) patients had coronary artery by-pass graft history. Eleven (4.72%) patients were evaluated in the green area, 96 (41.20%) patients were evaluated in the yellow area, 56 (24.03%) patients arrived at the hospital with an ambulance, and 70 (30.04%) patients were referred from another hospital. Ninety-nine (42.49%) patients had anterior MI, 131 (56.22%) patients had inferior MI, and 3 (1.29%) patients had posterior MI. The most common intervention was coronary stent (86.21%). Half (51.93%) of the patients applied to the hospital on weekdays between 00:00 and 15:59. The most common intervention locations were the left anterior descending artery (40.63%) and right coronary artery (45.98%). Seven (3.00%) patients had restenosis, 2 (0.86%) patients had ventricular tachycardia (VT) attacks, 2 (0.86%) patients had atrioventricular (AV) blockage and 2 (0.86%) patients had reintervention. Nineteen (8.15%) cases were mortal; three of them were during the intervention.

Table 1. *Summary of Arrival to PCI time*

Time (minutes)	41 (24 – 64)
≤30	84 (36.05%)
31–60	81 (34.76%)
61–90	34 (14.59%)
.91–120	17 (7.30%)
>120	17 (7.30%)

Data are given as median (1st quartile – 3rd quartile) or frequency (percentage)

Table 2. *Summary Arrival to PCI time, referred patients excluded*

Time (minutes)	52 (30–75)
≤30	41 (25.15%)
31–60	62 (38.04%)
61–90	30 (18.40%)
91–120	13 (7.98%)
>120	17 (10.43%)

Data are given as median (1st quartile – 3rd quartile) or frequency (percentage)

Table 3. *Arrival to PCI time (minute)*

Admission	Mean	Standard deviation	P
Direct visit	68.27	57.15	0.001
Direct by ambulance	55.55	45.08	
Referred	30.54	27.39	

We divided patients into three groups according to Arrival to PCI time (≤30, 31–60, and >60). The percentage of coronary artery disease was significantly higher in the ≤30 groups than in the 31–60 group ($p=0.027$) (Table 4). Admission to green area and yellow area percentages were significantly lower in the ≤30 groups than in the other groups, while referred from another hospital percentage was significantly higher in the ≤30 groups than in the other groups ($p<0.001$) (Table 5). There were no significant differences between groups about age, gender, comorbidities, admission, type of MI, stenosis locations, intervention, time of admission, intervention location, length of stay in the intensive care unit, length of stay in hospital, complications, and mortality (Table 4–6).

There was no significant difference between patients with and without complications concerning Arrival to PCI time (medians were 37 vs 42, $p=0.054$). There was no significant difference between mortal and non-mortal cases concerning Arrival to PCI time (medians were 37 vs. 43, $p=0.914$). We found no significant

Table 4. *Summary of patients demographics and history with regard to groups*

	Arrival to PCI time (minutes)				
	≤30 (n=84)	31–60 (n=81)	>60 (n=68)	Total (n=233)	p
Age	61.01±12.67	63.38±10.73	61.01±11.56	61.84±11.70	0.340
Gender					
Male	69 (82.14%)	69 (85.19%)	50 (73.53%)	188 (80.69%)	0.183
Female	15 (17.86%)	12 (14.81%)	18 (26.47%)	45 (19.31%)	
CAD history	26 (30.95%) [a]	12 (14.81%) [b]	12 (17.65%) [a b]	50 (21.46%)	0.027
Coronary stent history	13 (15.48%)	11 (13.58%)	4 (5.88%)	28 (12.02%)	0.169
CABG history	1 (1.19%)	2 (2.47%)	3 (4.41%)	6 (2.58%)	0.458
Hypertension	54 (64.29%)	56 (69.14%)	45 (66.18%)	155 (66.52%)	0.802
Diabetes mellitus	16 (19.05%)	13 (16.05%)	16 (23.53%)	45 (19.31%)	0.513
Hyperlipidemia	24 (28.57%)	26 (32.10%)	22 (32.35%)	72 (30.90%)	0.846
COPD	3 (3.57%)	5 (6.17%)	7 (10.29%)	15 (6.44%)	0.242

Data are given as mean ± standard deviation or median (1st quartile – 3rd quartile) for continuous variables according to normality of distribution and as frequency (percentage) for categorical variables. PCI, percutaneous coronary intervention; CAD, coronary artery disease; CABG, coronary artery by-pass graft; COPD, chronic obstructive pulmonary disease. Same letters denote the lack of statistically significant difference between groups.

Table 5. *Summary of patients procedural characteristics with regard to groups*

	Arrival to PCI time (minutes)				
	≤30 (n=84)	31–60 (n=81)	>60 (n=68)	Total (n=233)	p
Admission					
Direct visit, green area	0 (0.00%) [a]	7 (8.64%) [b]	4 (5.88%) [b]	11 (4.72%)	<0.001
Direct visit, yellow area	21 (25.00%) [a]	38 (46.91%) [b]	37 (54.41%) [b]	96 (41.20%)	
Direct by ambulance	20 (23.81%) [a]	17 (20.99%) a	19 (27.94%) [a]	56 (24.03%)	
Referred	43 (51.19%) [a]	19 (23.46%) [b]	8 (11.76%) [b]	70 (30.04%)	
Type of MI					
Anterior	37 (44.05%)	37 (45.68%)	25 (36.76%)	99 (42.49%)	0.471
Inferior	46 (54.76%)	44 (54.32%)	41 (60.29%)	131 (56.22%)	
Posterior	1 (1.19%)	0 (0.00%)	2 (2.94%)	3 (1.29%)	
Stenosis locations					
Left main	0 (0.00%)	0 (0.00%)	1 (1.47%)	1 (0.43%)	0.296
Left anterior descending	44 (52.38%)	48 (59.26%)	33 (48.53%)	125 (53.65%)	0.407
Circumflex	20 (23.81%)	22 (27.16%)	21 (30.88%)	63 (27.04%)	0.621
Right coronary artery	47 (55.95%)	40 (49.38%)	36 (52.94%)	123 (52.79%)	0.699
Intervention					
PCI	6 (7.23%)	7 (8.64%)	2 (2.94%)	15 (6.47%)	0.652
Balloon	5 (6.02%)	6 (7.41%)	6 (8.82%)	17 (7.33%)	
Stent	72 (86.75%)	68 (83.95%)	60 (88.24%)	200 (86.21%)	
Time of admission					
Weekdays 00:00–07:59	29 (34.52%)	17 (20.99%)	15 (22.06%)	61 (26.18%)	0.502
Weekdays 08:00–15:59	20 (23.81%)	22 (27.16%)	18 (26.47%)	60 (25.75%)	
Weekdays 16:00–23:59	12 (14.29%)	12 (14.81%)	12 (17.65%)	36 (15.45%)	
Weekend 00:00–07:59	8 (9.52%)	11 (13.58%)	12 (17.65%)	31 (13.30%)	
Weekend 08:00–15:59	10 (11.90%)	9 (11.11%)	4 (5.88%)	23 (9.87%)	
Weekend 16:00–23:59	5 (5.95%)	10 (12.35%)	7 (10.29%)	22 (9.44%)	

Data are given as mean ± standard deviation or median (1st quartile – 3rd quartile) for continuous variables according to normality of distribution and as frequency (percentage) for categorical variables. PCI, percutaneous coronary intervention; MI, myocardial infarction. Same letters denote the lack of statistically significant difference between groups.

Table 6. *Summary of intervention with regard to groups*

	Arrival to PCI time (minutes)				
Intervention location	≤30 (n=84)	31–60 (n=81)	>60 (n=68)	Total (n=233)	p
Left main	0 (0.00%)	4 (5.26%)	1 (1.49%)	5 (2.23%)	0.204
Left anterior descending	34 (41.98%)	31 (40.79%)	26 (38.81%)	91 (40.63%)	
Circumflex	6 (7.41%)	8 (10.53%)	11 (16.42%)	25 (11.16%)	
Right coronary artery	41 (50.62%)	33 (43.42%)	29 (43.28%)	103 (45.98%)	
Length of stay in ICU	2 (2–3)	2 (1–2)	2 (1–3)	2 (1–3)	0.393
Length of stay in hospital	3 (2–4)	3 (2–4)	3 (2–3)	3 (2–4)	0.436
Complications	6 (7.14%)	7 (8.64%)	0 (0.00%)	13 (5.58%)	0.054
Restenosis	4 (4.76%)	3 (3.70%)	0 (0.00%)	7 (3.00%)	
VT attacks	2 (2.38%)	0 (0.00%)	0 (0.00%)	2 (0.86%)	
AV blockage	0 (0.00%)	2 (2.47%)	0 (0.00%)	2 (0.86%)	
Reintervention	0 (0.00%)	2 (2.47%)	0 (0.00%)	2 (0.86%)	
Mortality	7 (8.33%)	6 (7.41%)	6 (8.82%)	19 (8.15%)	0.949
Referred excluded mortality	3 (7.32%)	3 (4.84%)	5 (8.33%)	11 (6.75%)	0.733

Data are given as mean ± standard deviation or median (1st quartile – 3rd quartile) for continuous variables according to normality of distribution and as frequency (percentage) for categorical variables. ICU, intensive care unit; VT, ventricular tachycardia; AV, atrioventricular. Same letters denote the lack of statistically significant difference between groups.

Table 7. *Significant risk factors of the mortality, multiple logistic regression analysis*

	β coefficient	Standard Error	p	Exp (β)	95% CI for Exp (β)	
Age	0.084	0.027	0.002	1.087	1.030	1.147
Female gender	1.386	0.651	0.033	3.998	1.116	14.328
Left anterior descending stenosis	1.584	0.653	0.015	4.872	1.355	17.523
Complication	3.940	0.855	<0.001	51.436	9.635	274.601
Constant	-9.936	2.144	<0.001			

Dependent variable: Mortality; Nagelkerke R^2=0.363; Correct prediction=92.70%; CI, confidence interval.

correlation between Arrival to PCI time and age (r=-0.013, p=0.844), Arrival to PCI time, and length of stay in an intensive care unit (r=-0.079, p=0.229), Arrival to PCI time, and length of stay in hospital (r=-0.052, p=0.433).

We performed multiple logistic regression analyses to determine significant risk factors of mortality. We found that the risk of mortality increases with age (p=0.002). Female patients had a 3.998-fold higher risk of death than male patients (OR: 3.998, 95% CI: 1.116–14.328, p=0.033). Patients with left anterior descending artery stenosis had a 4.872-fold higher risk of death than the other patients (OR: 4.872, 95% CI: 1.355–17.523, p=0.015). Patients who had a complication during/after the intervention had a 51.436-fold higher risk of death than the other patients (OR: 51.436, 95% CI: 9.635–274.601, p<0.001). Other variables included in the model, Arrival to PCI time (p=0.219), coronary artery disease history (p=0.497), coronary stent history (p=0.431), coronary artery bypass graft history (p=0.287), admission unit (p=0.975), type of MI (p=0.985) and time of admission (p=0.948) were found to be non-significant (Table 7).

Discussion

Our study once again emphasizes the importance of the time to reach PCI in patients with STEMI.

STEMI account for approximately 25% to 40% of acute myocardial infarction (AMI) cases. Although in-hospital mortality rates of 5–6% and annual mortality rates of 7–18%, and STEMI-related mortality have decreased in recent years, they are still an important cause of mortality[4].

Delays in treatment lead to increased mortality and deterioration of cardiac functions. D2B, the time between hospital arrival and PCI, is strongly associated with survival in STEMI patients. It is recommended that more than 75% of STEMI patients have a D2B time of fewer than 90 minutes[6].

The demographic characteristics of the patients in our study are similar to those of published studies. 19.31% of the patients included in our study were female, and 21.46% had a history of coronary artery disease. Hypertension (66.52%) was the most common comorbidity. Similar to other studies, the left anterior (LAD) and right coronary arteries (40.63%, 45.98%, respectively) were found to be the coronary arteries with the most stenosis[7,8]. The rate of reaching PCI in 30 minutes or less in patients with a history of coronary artery disease was statistically significantly higher than the other patient groups (p=0.027).

The first place of application for 69.95% of the patients included in our study was the ED of our hospital, 45.9% were outpatients, and 24.03% of them came to our ED with the pre-hospital emergency health system (EMS). 85.4% of patients achieved PCI in less than 90 minutes. On the other hand, in 81.59% of the patients whose first referral center is our hospital, the time to reach PCI is less than 90 minutes. The time to reach PCI was found to be 68.27±57.15 minutes for outpatients and 55.55±45.08 minutes for patients presenting with EMS. While 66.07% of the patients who came with EMS, which was the first place of application to our hospital, reached PCI under 60 minutes, 61.68% of the outpatients reached PCI below 60 minutes. There was a significant difference between the patient groups, divided into three according to the time to reach PCI and how they applied. While 55.55% of the patients in the 31–60 group, who had time to reach PCI, applied directly to our ED, 20.99% of this group consisted of patients who came directly to our ED by ambulance. While the rate of reaching PCI at 30 minutes and less in outpatients was significantly lower than the other groups, the rates of reaching PCI in 30 minutes and less in patients referred from another hospital were significantly higher than the other groups (25%, 51.19%, respectively; p: <0.001). The EMS informing the referred patients before they come to our hospital and the catheter laboratory is activated, the short time to reach PCI can be explained. However, our study did not determine how long it took the referred patients to come to our hospital from the first center they applied. In the TURKMI study, Erol MK et al.[9] reported that from arrival to the first hospital to reach the second hospital was 120 minutes In the same study, similar to ours, most of the patients (49.5%) came by themselves, 11.8% by EMS ambulance. It was found that EMS transferred 38.6% from another hospital where PCI could not be performed, and the D2B time was 36 minutes. In another study published in Turkey, the mean D2B time was 98 minutes in patients who applied directly and underwent PCI and 228 minutes in those who were referred[10]. In another study conducted with 43 801 patients, the D2B time was 83 minutes, and 57.9% of the patients had a D2B time of fewer than 90 minutes[7].

Eleven patients who applied to our ED with atypical findings (long-standing pain, weakness, epigastric pain, etc.) were diagnosed with STEMI. None of these patients could reach PCI in less than 30 minutes. In the study of Takuya Nakahashi et al., 40% of AMI patients presenting with atypical symptoms had a D2B time under 90 minutes, while 66.3% of patients presenting with typical symptoms had a D2B time under 90 minutes. Patients presenting with atypical symptoms in AMI patients had a long time to reach PCI and high 30-day mortality[11].

For STEMI patients presenting to a hospital capable of performing PCI in the AHA, it is recommended that the primary PCI procedure be completed within 90 minutes. In our study, the meantime to reach PCI was calculated as 41 minutes for all patients and 52 minutes for patients whose first application was the ED of our hospital. There was no significant difference between patients with and without complications in terms of arrival time to PCI (medians were 37 vs 42, p=0.054). There was no significant difference between the cases with a mortal course and the cases without mortality in terms of the time of arrival to PCI (medians were 37 vs 43, p=0.914). There was no significant relationship between the time to reach PCI and mortality. The mortality rate was calculated as 8.15%, and it was found to be higher than in other studies[10,12]. When patients referred from another hospital are excluded, the mortality rate drops to 6.75%. This may be due to the delay in the diagnosis period of the patients who came with a referral in the center they applied to before coming to our hospital and the long referral duration. Many studies have reported that shortening

the D2B time increases survival[13–15]. In the study of Cannon et al., it was shown that if the D2B duration is longer than 2 hours, there will be a 41–62% increase in in-hospital mortality[16]. However, there are also studies showing that shortening the D2B time does not affect mortality. In a study evaluating the effect of D2B time on mortality, including 96.738 patients with STEMI who underwent primary PCI between 2005 and 2009, D2B time decreased from 83 minutes to 67 minutes over the years. However, in-hospital mortality (5.0% in 2005–2006 and 4.7% in 2008–2009) was unchanged. Although national D2B improved significantly in patients undergoing primary PCI for their STEMI, in-hospital mortality remained virtually unchanged[12].

In our study, it was also found that mortality increased with age (p=0.002). The risk of death in female patients was 3.998 times higher than in male patients (OR: 3.998, 95% CI: 1.116–14.328, p=0.033). Similarly, in a study, in-hospital and 30-day mortality in STEMI patients was higher in women[17,18]. In addition, in our study, the risk of death in patients with left anterior coronary artery stenosis was found to be 4.872 times higher than in other patients, consistent with the literature (OR: 4.872, 95% CI: 1.355–17.523, p=0.015) [4].

In this study, although the time to reach PCI complies with current guidelines, it shows that there is a need for shortening the time to reach PCI and additional strategies to reduce in-hospital mortality.

Limitations

Our study has several limitations that should be considered. First, the time of onset of symptoms was not evaluated in our study. We could not assess the relationship between the time from onset of symptoms to reaching PCI and mortality. In addition, the application times of the patients who came to our hospital with a referral from another hospital where PCI could not be performed and the time elapsed until they came to our hospital were not included in our study. Our study aimed to evaluate the time it takes to reach PCI and its effect on the survival of patients admitted to our hospital and guide our improvement efforts within the hospital. The time of arrival of the patients coming from an external center to our hospital is under the control of the pre-hospital health system, so it will not be affected by our in-hospital improvement efforts.

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