ORIGINAL ARTICLE

In-hospital outcomes of patients undergoing emergent surgical treatment in patients with infective endocarditis

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ABSTRACT

BACKGROUND: Infective endocarditis is a serious heart disease that may cause several different clinical conditions and can need urgent surgical therapy. In our study, we aimed to evaluate the patients with infective endocarditis undergoing acute surgical treatment results in-hospital mortality.

METHODS: A total of 107 consecutive patients with infective endocarditis undergoing acute surgical therapy were included in our retrospective study. The patients were divided into two groups according to the presence of in-hospital mortality as Group 1 without in-hospital mortality (n=89) and Group 2 with in-hospital mortality (n=18). The demographic, laboratory, and clinical parameters were evaluated in both groups.

RESULTS: The mean age (50±14; 64±14, P<0.001) and the incidence of chronic renal failure (9 [10.1%]; 8 [44.4%], P=0.001) were higher in Group 2 while the ejection fraction was lower in Group 2 (50.0±9.3; 44.6±12.9, P=0.039). The incidence of positive blood culture was also higher in Group 2 (41 [46.1]; 14 [77.8], P=0.014). Aortic bioprosthesis operation (2 [2.2]; 6 [33.3], P<0.001) and mitral bioprosthesis operation (4 [4.5]; 5 [27.8], P=0.008) were higher in Group 2 as well as the incidence of septic shock was also higher in Group 2 (1 [1.1]; 3 [16.7], P=0.015). In addition, in multivariate logistic regression analyses, advanced age (odds ratio [OR]: 1.068, 95% confidence interval [CI]: 1.009–1.130, P: 0.024) and positive blood culture (OR: 4.436, 95% CI: 1.044–18.848, P: 0.044) were found to be independent predictors of in-hospital mortality.

CONCLUSION: Advanced age, lower ejection fraction, high creatinine, positive blood culture, high systolic pulmonary artery pressure, and septic shock predicted in-hospital death in patients who have undergone emergent or urgent surgery due to infective endocarditis.

Keywords: Emergent surgery; infective endocarditis; in-hospital mortality.

INTRODUCTION

Infective endocarditis is a serious heart disease that may cause several different clinical conditions. It results in approximately 15–30% in-hospital mortality rates and its incidence is 3–10/100000 in a year.[1-3] Heart failure, uncontrolled infection, and systemic embolism are the main causes of surgical therapy in infective endocarditis.[4] Although the improved antibiotic treatment regimens are successfully used, acute surgical treatment may be needed in patients with acute complications.[4] These patients have also increased mortality rates. In our study, we aimed to evaluate the patients with infective endocarditis undergoing acute surgical treatment results in-hospital mortality.

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MATERIALS AND METHODS

A total of 107 consecutive patients, who were diagnosed with definite infective endocarditis based on the modified Duke criteria, undergoing acute surgical therapy were included in our retrospective study from 2008 to 2020. Infective endocarditis results in acute aortic or mitral regurgitation, obstruction, or fistula causing refractory pulmonary edema or cardiogenic shock is the indication of emergent surgical therapy (<1 day) while urgent surgical operation (1–7 days) indications are as follows: (a) Acute severe aortic or mitral valve regurgitation with poor hemodynamic tolerance, (b) locally uncontrolled infection, (c) infection caused by fungi or multi-resistant microorganisms, (d) persistent positive blood culture with antibiotic therapy and uncontrolled metastatic foci, (e) staphylococci or non-HACEK gram negative prosthetic valve endocarditis, (f) aortic or mitral NVE or PVE with persistent vegetations, 10 mm after one or more embolic episode despite appropriate antibiotic therapy, (g) aortic or mitral NVE with vegetations 0.10 mm, associated with severe valve stenosis or regurgitation, and low operative risk, and (h) aortic or mitral valve endocarditis with large (>15 mm) or very large (>30 mm) vegetations according to the recent guideline.[4] The baseline characteristics and clinical conditions of the whole study group were evaluated from the hospital database. In addition, factors linked to infective endocarditis such as predisposing factors and vascular phenomena include major arterial emboli, septic pulmonary infarcts, mycotic aneurysms, intracranial hemorrhages, conjunctival hemorrhages or Janeway lesions, microbiology and echocardiography findings, complications, and surgical management were also collected. The baseline laboratory parameters were also evaluated from the database. Routine laboratory tests and blood cultures were performed at the time of hospital admission and during treatment. Blood samples were collected from at least three separate venous sites for blood cultures at 1-h intervals starting at admission to the hospital. Any other tissue (valves, vegetation) removed at surgery or foreign body samples (pacemaker leads, device) were used to isolate microorganisms. After the blood cultures were examined, appropriate antibiotic regimens were started for all patients immediately.

Transthoracic echocardiographic evaluation was performed for all cases and transesophageal was formed almost all (by Vivid 5 [GE, Horten, Norway] or Epic 7 [Philips, Amsterdam, Netherlands]). They were also used for the diagnosis and follow-up of the patient as well as detection the complications. Complication rates such as in-hospital mortality, renal failure, rhythm disturbances, cerebrovascular attack, heart failure, and septic shock were considered as outcomes. The study was approved by the local ethic committee.

Statistical Analysis

The Statistical Package for the Social Sciences (IBM SPSS Statistics for Windows, Armonk, NY) was used. The data were presented as mean ± SD for variables with normal distribution while median (25th–75th percentiles) for continuous variables without normal distribution and as percentage (number of cases) for categorical variables. The Kolmogorov–Smirnov test was used to detect normal distributions. Independent sample t-test was used between the two groups which showed normal distribution. Mann–Whitney U-test was used for the variables without normal distribution. Pearson's Chi-square and Fisher's exact tests were used for the categorical variants. The baseline variables for which significance is evident (P<0.05) by univariate analysis were included in multivariate logistic regression analysis (Enter Model) to determine the independent predictors of in-hospital mortality.

RESULTS

A total of 107 patients with infective endocarditis who underwent urgent surgery were evaluated. The patients were divided into two groups according to the presence of in-hospital mortality as Group 1 without in-hospital mortality (n=89) and Group 2 with in-hospital mortality (n=18). The baseline demographic and clinical variables of both groups were demonstrated in Table 1. The mean age was higher in Group 2 compared to Group 1 (50±14; 64±14, P<0.001). The incidence of chronic renal failure (9 [10.1%]; 8 [44.4%], P=0.001), chronic obstructive lung disease (2 [2.2%]; 3 [16.7%], P=0.033), and dyspnea (41 [46.1%]; 16 [88.9%], P=0.001) were higher in Group 2. Platelet count (262±102; 208±107, P=0.049) and calcium (8.6 [8.2–9.0]; 8.05 [7.7–8.2], P=0.001) were lower in Group 2, while creatinine (0.9 [0.7–1.1]; 1.3 [1.0–2.0], P=0.003) was higher in Group 2.

Previous cardiac features and in-hospital evaluation were demonstrated in Table 2. There were differences in terms of intensive care unit stay, previous heart valve disease and operation, and congenital heart disease. However, the ejection fraction was lower in Group 2 (50.0 ± 9.3; 44.6 ± 12.9, P = 0.039] while systolic pulmonary artery pressure (40 [25–45]; 45 [40–60], P = 0.013) was higher in Group 2 compared to Group 1.

Infective endocarditis properties and clinical parameters were demonstrated in Table 3. There were no significant differences in peripheral embolism, immune phenomena, vascular phenomena, vegetation characteristics, ischemic infarct, hemorrhagic infarct, subdural hematoma, predisposing factors, antibiotherapy usage, and high-risk criteria. The incidence of positive blood culture was higher in Group 2 (41 [46.1]; 14 [77.8], P=0.014).

Urgent surgical characteristics and clinical complications were demonstrated in Table 4. Aortic bioprosthesis operation (2 [2.2]; 6 [33.3], P<0.001] and mitral bioprosthesis operation (4 [4.5]; 5 [27.8], P=0.008) were higher in Group 2 as well as the incidence of septic shock was also higher in Group 2 (1 [1.1]; 3 [16.7], P=0.015).

The univariate and multivariate logistic regression analyses

Table 1. Baseline demographic and clinical parameters of groups

	Patients without in-hospital mortality (n=89)	Patients with in-hospital mortality (n=18)	P-value
Age (years)	50±14	64±14	<0.001
Gender (female), n (%)	27 (30.3)	4 (22.2)	0.489
Diabetes mellitus, n (%)	8 (9.0)	1 (5.6)	0.532
Hypertension, n (%)	16 (18.0)	5 (27.8)	0.256
Coronary artery disease, n (%)	16 (18.0)	3 (16.7)	0.600
Congestive heart failure, n (%)	6 (6.7)	4 (22.2)	0.062
Atrial fibrillation, n (%)	9 (10.1)	4 (22.2)	0.149
Cardiac pacemaker, n (%)	7 (7.9)	1 (5.6)	0.597
Chronic renal failure, n (%)	9 (10.1)	8 (44.4)	0.001
Chronic obstructive lung disease, n (%)	2 (2.2)	3 (16.7)	0.033
Valvular heart disease	60 (67.4)	16 (88.9)	0.067
Immunosuppressive disease, n (%)	3 (3.4)	0 (0)	0.572
Angina pectoris, n (%)	27 (30.3)	7 (38.9)	0.472
Dyspnea, n (%)	41 (46.1)	16 (88.9)	0.001
Palpitation, n (%)	23 (25.8)	8 (44.4)	0.113
Syncope, n (%)	5 (5.6)	3 (16.7)	0.130
Fever, n (%)	59 (66.3)	14 (77.8)	0.340
Cerebrovascular accident	12 (13.5)	1 (5.6)	0.314
Hemoglobin	10.79±2.1	10.09±1.74	0.194
Hematocrit	32.7±6.1	31.0±5.2	0.255
Leukocyte	10.4 (7.8–14.1)	13.2 (8.2–17.8)	0.247
Platelet	262±102	208±107	0.049
C-reactive protein	60 (30–114)	106.5 (66–126)	0.151
Creatinine	0.9 (0.7–1.1)	1.3 (1.0–2.0)	0.003
Sodium	136 (133–139)	134.5 (130–137)	0.069
Potassium	4.2±0.6	4.3±0.6	0.584
Calcium	8.6 (8.2–9.0)	8.05 (7.7–8.2)	0.001
Alanine aminotransferase	16 (11–25)	23 (9–133)	0.588
Aspartate aminotransferase	19 (15–30)	32 (13–66)	0.284

were used to predict independent predictors of in-hospital mortality. The variables that were found statistically significant in univariate analysis were put into the multivariate regression analysis model. Finally, age (odds ratio [OR]: 1.068, 95% confidence interval [CI]: 1.009–1.130, P: 0.024) and positive blood culture (OR: 4.436, 95% CI: 1.044–18.848, P: 0.044) were found to be independent risk factors for in-hospital mortality (Table 5).

DISCUSSION

Emergent and urgent surgical operation results in poorer outcomes in infective endocarditis. In our study, it was demonstrated that patients with older age, severe dyspnea, increased creatinine level, higher systolic pulmonary artery pressure, and lower ejection fraction were associated with higher in-hospital mortality rates in those patients. In addition, positive blood culture, previous valve prosthesis presence, and septic shock due to infective endocarditis were related to poorer in-hospital outcomes in infective endocarditis. Advanced age and positive blood culture were also found to be independent predictors of in-hospital mortality in patients with infective endocarditis.

Infective endocarditis is a common cardiac disease that may need acute medical or surgical therapy. Despite modern medical and surgical treatments developed in recent years, infective endocarditis is still a disease with high mortality and morbidity rates. Mortality rates of 10–30% were reported in several registries.[5] In our study, the mortality rate was

Table 2. Cardiac and in-hospital evaluation of groups

	Patients without in-hospitalt mortality (n=89)	Patients with in-hospital mortality (n=18)	P-value
Intensive care unit stay (days)	4 (2–7)	8 (3–20)	0.058
Drug addict, n (%)	2 (2.2)	1 (5.6)	0.428
Mitral valve, n (%)			
Degenerative	12 (13.5)	8 (44.4)	
Prolapses	7 (7.9)	1 (5.6)	
Rheumatic	10 (11.2)	2 (11.1)	0.062
Prosthetic valve	22 (24.7)	4 (22.2)	
Annuloplasty	1 (1.1)	0 (0)	
Mitral stenosis, n (%)	18 (20.2)	2 (11.8)	0.331
Mitral regurgitation, n (%)	68 (76.4)	14 (82.4)	0.428
Aortic valve, n (%)			
Prosthetic valve	12 (13.5)	7 (41.2)	
Degenerative	17 (19.1)	4 (23.5)	
Bicuspid	6 (6.7)	0 (0)	0.060
Rheumatic	8 (9.0)	1 (5.9)	
Native valve, n (%)	60 (67.4)	8 (44.4)	
Prosthetic valve, n (%)	26 (29.2)	9 (50.0)	0.182
Intra-cardiac device, n (%)	3 (2.8)	1 (5.6)	
Aortic stenosis, n (%)	14 (15.7)	3 (17.6)	0.542
Aortic regurgitation, n (%)	48 (53.9)	10 (58.8)	0.710
Systolic pulmonary artery pressure (mmHg)	40 (25–45)	45 (40–60)	0.013
Ejection fraction (%)	50.0 ±9.3	44.6±12.9	0.039
Pericardial effusion, n (%)	11 (12.4)	1 (5.9)	0.390
Congenital heart disease, n (%)	3 (3.4)	0 (0)	0.589

similar to the literature with a 16% incidence. The number of patients undergoing surgical treatment increases in infective endocarditis. The timing of surgery in infective endocarditis is still controversial despite this increased rate of operation. Although early surgery is highly recommended in patients with infective endocarditis who present with signs of congestive heart failure,[4,6,7] the indications for surgery to prevent systemic embolism remain undefined.[4,6,8]

The operative prognosis of infective endocarditis is determined by many parameters such as microbiological etiology, location and mode of involvement, pre-operative patient characteristics, and timing of surgery.[9] A study by Gatti et al. demonstrated that higher systolic pulmonary artery pressure than 50 mmHg was an independent predictor of mortality in patients undergoing infective endocarditis surgery and described a new scoring system that includes the systolic pulmonary artery pressure value to predict in-hospital mortality.[10] Similarly, in our study, systolic pulmonary artery pressure was found to be associated with increased in-hospital mortality. High creatinine levels are also a predictor of in-hospital mortality. Pang et al. reported that decreased pre-operative creatinine clearance was an independent predictor of in-hospital death.[11] In a large series of 360 patients, Farag et al. reported that impaired renal function was strongly associated with poor early post-operative outcomes.[12] In our retrospective data, elevated creatinine levels before the procedure were also associated with increased in-hospital mortality.

In our study, left ventricular ejection fraction was significantly lower in the group with in-hospital mortality compared to the group without mortality. Furthermore, patients in septic shock were more common in the in-hospital mortality group. This results were similar with many studies in the literature. Guiomar et al. evaluated 145 patients with infective endocarditis and it was reported that low ejection fraction, sepsis, and septic shock were important predictors of early mortality after emergency surgery.[13] In addition, it was demonstrated that acute heart failure and cardiogenic shock are important factors that determine the timing of emergency surgery.[4]

In previous studies, advanced age was found to be related to poorer outcomes in patients with infective endocarditis.[9] In

Table 3. Clinical conditions of infective endocarditis

	Patients without in-hospital mortality (n=89)	Patients with in-hospital mortality (n=18)	P-value
Peripheral embolism, n (%)	1 (1.1)	0 (0)	0.832
Immune phenomena, n (%)	3 (3.4)	1 (5.6)	0.527
Vascular phenomena, n (%)	14 (15.7)	4 (22.2)	0.355
Vegetation, n (%)	68 (76.4)	13 (76.5)	0.633
Vegetation, n (%)			
Aortic	32 (36.0)	10 (58.8)	0.077
Mitral	40 (44.9)	5 (29.4)	0.235
Tricuspid	5 (5.6)	0 (0)	0.410
Intracardiac device	1 (1.1)	0 (0)	0.840
Mobility	56 (83.6)	8 (66.7)	0.163
Vegetation size, n (%)			
<10	30 (25.3)	1 (5.9)	
10–15	22 (27.8)	7 (41.2)	0.188
>15	37 (46.8)	9 (52.9)	
Ischemic infarct	6 (6.7)	1 (5.6)	0.665
Hemorrhagic infarct	3 (3.4)	0 (0)	0.572
Septic embolism	2 (2.2)	0 (0)	0.691
Subdural hematoma	0 (0)	1 (5.6)	0.168
High-risk group, n (%)	31 (34.8)	9 (50.0)	0.225
Positive blood culture, n (%)	41 (46.1)	14 (77.8)	0.014
Streptokok	7 (17.1)	1 (7.1)	0.014
Stenotrophomonas maltophilia	1 (2.4)	1 (7.1)	
Serratia marcescens	1 (2.4)	0 (0)	
Psödomonas	1 (2.4)	0 (0)	
MSSA	3 (7.3)	3 (21.4)	
MSKNS	9 (22.0)	2 (14.3)	
MRSA	3 (7.3)	0 (0)	
MRKNS	9 (22.0)	5 (35.7)	
Enterococcus faecalis	4 (9.8)	0 (0)	
Escherichia coli	0 (0)	1 (7.1)	
Corynebacterium striatum	1 (2.4)	0 (0)	
Candida	1 (2.4)	1 (7.1)	
Brucella	1 (2.4)	0 (0)	

MRKNS: Methicillin-resistant coagulase-negatıve Staphylococcus,; MRSA: Methicillin-resistant Staphylococcus aureus; MSKNS: Methicillin-sensitive coagulase-negative Staphylococcus; MSSA: Methicillin sensitive Staphylococcus aureus.

addition, advanced age is included in scoring systems which are developed specifically for the risk of infective endocarditis surgery. In the risk scoring system developed from the Society of Thoracic Surgeons database, in which 13 617 patients were used, being over 60 years of age was defined as associated with poor outcomes after surgery.[14] In our study, it was observed that increasing age was clearly associated with in-hospital death. Age was identified as an independent predictor of death in the multivariate analysis. In addition, six predictors including age, renal failure, NYHA class IV, critical pre-operative state, lack of pre-operative attainment of blood culture negativity, and perivalvular involvement were identified in the risk score system developed by De Feo et al. using 440 patients.[9]

Finally, we found the presence of a positive blood culture

Table 4. Surgical procedures and clinical complications

	Patients without in-hospital mortality (n=89)	Patients with in-hospital mortality (n=18)	P-value
Surgical indication, n (%)			
Congestive heart failure	37 (41.6)	10 (55.6)	
Uncontrolled infection	24 (27.0)	5 (27.8)	0.406
Embolism	28 (31.5)	3 (16.7)	
Surgery time (days)	4±2	3±1	0.030
Aortic valve surgery, n (%)			
Mechanic prosthesis	38 (42.7)	6 (33.3)	
Bioprosthesis	2 (2.2)	6 (33.3)[a]	<0.001
Annuloplasty	2 (2.2)	0 (0)	
Mitral valve surgery, n (%)			
Mechanic prosthesis	56 (62.9)	8 (44.4)	
Bioprosthesis	4 (4.5)	5 (27.8)[a]	0.008
Annuloplasty	6 (6.7)	0 (0)	
Tricuspid valve surgery, n (%)			
Prosthesis	3 (3.4)	1 (5.6)	0.762
Annuloplasty	15 (16.9)	4 (22.2)	
Coronary artery bypass grafting surgery, n (%)	5 (5.6)	2 (11.1)	0.335
Bentall operation, n (%)	3 (3.4)	1 (5.6)	0.527
Lead change, n (%)	4 (4.5)	1 (5.6)	0.610
Clinical complication, n (%)			
Heart failure	3 (3.4)	3 (16.7)	0.058
Renal disease	7 (7.9)	4 (22.2)	0.087
Cerebrovascular accident	2 (2.2)	0 (0)	0.691
Intracerebral hemorrhage	2 (2.2)	0 (0)	0.691
Peripheral embolism	3 (3.4)	0 (0)	0.572
Rhythm disturbance	9 (10.1)	0 (0)	0.177
Septic shock	1 (1.1)	3 (16.7)	0.015
Pericarditis/myocarditis	1 (1.1)	0 (0)	0.832
Re-endocarditis	3 (3.4)	0 (0)	0.572

a=higher than Group 1 with statistically significance.

Table 5. Multivariate logistic regression analysis to predict independent predictors of in-hospital mortality

	Odds ratio	95% CI (Lower-Upper)	P-value
Age	1.068	1.009–1.130	0.024
Creatinine	1.305	0.746–2.283	0.350
Systolic pulmonary artery pressure	1.041	0.999–1.085	0.056
Positive blood culture	4.436	1.044–18.848	0.044
Septic shock	10.974	0.849–141.874	0.067
Ejection fraction	0.976	0.925–1.030	0.376

as an independent predictor of early mortality due to infective endocarditis surgery. Data in the literature for comparing blood culture-negative endocarditis (BCNE) and blood culture-positive endocarditis (BCPE) patients regarding the mortality outcome are controversial. Our study findings indicate significant differences between BCPE and BCNE patients. Meidrops et al. compared the outcome between BCPE and BCNE patients undergoing cardiac surgery and the detection of microorganism was found to be significantly associated with intrahospital death in univariate analyses; however, it did not reach statistical significance in multivariate analyses.[15] In the study of De Feo et al., relationship was observed between blood culture positivity and post-operative in-hospital mortality. Moreover, lack of pre-operative attainment of blood culture negativity was defined as a parameter in the risk-scoring system.[9] On the other hand, the EURO-ENDO registry has shown higher long-term mortality in patients with BCNE compared with patients with BCPE in the medical subgroup but not in those who underwent surgery.[16] We think that the kind of microorganisms and appropriate antibiotherapy usage are more important determinants to be related to prognosis in infective endocarditis.

Limitations

The small sample size was the major limitation of our study. The retrospective design was also the other limitation while we did not have the follow-up results due to the retrospective nature of the study. It was also confounding that we do not know whether the parameters which were related with in-hospital mortality were also related to long-term adverse outcomes.

CONCLUSION

In our retrospective study, it was determined that advanced age, lower ejection fraction, high creatinine, positive blood culture, high systolic pulmonary artery pressure, and septic shock predicted in-hospital death in patients who undergone to emergent or urgent surgery due to infective endocarditis. Advanced age and blood culture positivity were also found to be independent predictors of in-hospital poorer outcomes.

Ethics Committee Approval: This study was approved by the Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Center Ethics Committee (Date: 07.04.2023, Decision No: 10678112-514.10-2023-01).

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ORİJİNAL ÇALIŞMA - *ÖZ*

Acil cerrahi tedavi uygulanan enfektif endokardit hastalarının hastane içi sonlanımları

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AMAÇ: Enfektif endokardit birkaç farklı klinik duruma neden olabilen ve acil cerrahi tedavi gerektirebilen ciddi bir kalp hastalığıdır. Çalışmamızda akut cerrahi tedavi uygulanan enfektif endokarditli hastaların hastane içi mortalite sonuçlarını değerlendirmeyi amaçladık.

GEREÇ VE YÖNTEM: Retrospektif çalışmamıza akut cerrahi tedavi uygulanan enfektif endokarditli ardışık toplam 107 hasta dahil edildi. Hastalar hastane içi mortalite varlığına göre hastane içi mortalite olmayan grup 1 (n=89) ve hastane içi mortalite olan grup 2 (n=18) olarak iki gruba ayrıldı. Her iki grupta demografik, laboratuvar ve klinik parametreler değerlendirildi.

BULGULAR: Ortalama yaş (50±14; 64±14, p<0.001) ve kronik böbrek yetmezliği insidansı [9 (%10.1); 8 (%44,4), p=0.001] grup 2'de daha yüksek, ejeksiyon fraksiyonu ise grup 2'de daha düşüktü [50.0±9.3; 44.6±12.9, p=0.039]. Pozitif kan kültürü insidansı da grup 2'de daha yüksekti [41 (46.1); 14 (77.8), p=0.014]. Aortik biyoprotez ameliyatı [2 (2.2); 6 (33.3), p<0.001] ve mitral biyoprotez ameliyatı [4 (4.5); 5 (27.8), p=0.008] grup 2'de daha yüksekti ve septik şok insidansı da grup 2'de daha yüksekti [1 (1.1); 3 (16.7), p=0.015]. Ayrıca çok değişkenli lojistik regresyon analizlerinde ileri yaş [Odds oranı: 1.068, %95CI: 1.009-1.130, p=0.024] ve pozitif kan kültürünün [Odds oranı: 4.436, %95CI: 1.044-18.848, p=0.044] hastane içi mortalitenin bağımsız belirteçleri olduğu bulundu.

SONUÇ: İleri yaş, düşük ejeksiyon fraksiyonu, yüksek kreatinin, pozitif kan kültürü, yüksek sistolik pulmoner arter basıncı, septik şok enfektif endokardit nedeniyle acil cerrahi uygulanan hastalarda hastane içi ölümü öngördürücüsü olarak belirlendi.

Anahtar sözcükler: Cerrahi; hastane içi mortalite; infektif endokardit.

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