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Research Article

Evaluation of post cardiopulmonary resuscitation patıents followed in intensive care unit: A one-year retrospective analysis

Yoğun bakım ünitesinde takip edilen kardiyopulmoner resüsitasyon sonrası hastaların değerlendirilmesi: Bir yıllık retrospektif analiz

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Abstract

Aim: Post Cardiopulmonary Resuscitation (CPR) patients are a critical patient group. Despite the development of treatment options and guidelines, mortality and morbidity rates in these patients remain high. We aimed to obtain a descriptive data for post CPR patients admitted to the Intensive Care Unit (ICU).

Material and Methods: This single-center, retrospective observational study was conducted in the mixed ICU's at the Karabuk University Hospital in Karabuk, Turkey, from January 2023 to Jan 2024. Demographic data of the post-CPR patients, Acute Physiology and Chronic Health Evaluation II (APACHE II) and Glasgow coma scores (GCS), length of stay in the ICU and mortality were recorded through our hospital database.

Results: During the study period,78 patients were evaluated. The mean age of the patients was 75.01 ± 9.6 years, and 42 of them were female (53.84%). The mean APACHE II scores on ICU admission was 21.15 ± 7.2, and mean GCS was 8.29 ± 2.4. Comorbid diseases was present in 96.15% of the patients, and 35 patients had 3 or more comorbid diseases. Twenty-six patients survived whereas 52 died in ICU. APACHE II scores and. The lactate levels were higher, whereas GCS score was lower in nonsurvivors.

Conclusion: High mortality rates have been reported for post CPR patients. Many factors have been suggested to be prognostic for these patients. In our died patients, the lactate level and their APACHE II scores were higher and their GCS scores were lower.

Keywords: Cardiopulmonary arrest, Intensive care, Mortality Rate.

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Öz

Amaç: Kardiyopulmoner resüsitasyon (KPR) sonrası hastalar kritik bir hasta grubudur. Günümüzde tedavi seçenekleri ve kılavuzların gelişmesine rağmen bu hastalarda mortalite ve morbidite oranları hala yüksektir. Yoğun Bakım Ünitesine (YBÜ) kabul edilen KPR sonrası hastalar için tanımlayıcı veriler elde etmeyi amaçladık.

Gereç ve Yöntemler: KPR sonrası hastaların demografik verileri, Akut Fizyoloji ve Kronik Sağlık Değerlendirmesi II (APACHE II) ve Glasgow koma skorları (GKS), yoğun bakımda kalış süreleri ve ölüm oranları hastanemiz veri tabanı üzerinden kayıt altına alındı.

Bulgular: Çalışma süresi boyunca 78 hasta değerlendirildi. Hastaların yaş ortalaması 75.01±9.6 yıl olup 42'si (%53.84) kadındı. Yoğun bakım ünitesine kabulde ortalama APACHE II skoru 21.15 ± 7.2, ortalama GKS 8.29 ± 2.4 idi. Hastaların %96.15'inde yandaş hastalık mevcuttu ve 35 hastada 3 ve daha fazla yandaş hastalık mevcuttu. Yoğun bakımda 26 hasta hayatta kalırken 52 hasta hayatını kaybetti. Ölen hastalarda APACHE II skorları ve laktat düzeyi daha yüksek, buna karşın GKS skoru ise daha düşüktü.

Sonuç: KPR sonrası hastalarda yüksek mortalite oranları rapor edilmiştir. Bu hastalar için prognostik olduğu öne sürülen birçok faktör vardır. Ölen hastalarımızda laktat düzeyi ve APACHE II skoru daha fazla, GCS skoru ise daha düşüktü.

Anahtar Kelimeler: Kardiyopulmoner arest, Yoğun bakım, Mortalite Oranı.

Introduction

Cardiopulmonary arrest (CPA) is defined as a sudden and unexpected cessation of a person's breathing and/or circulation for any reason. Cardiopulmonary resuscitation (CPR) encompasses all basic and advanced life support procedures applied to these patients.

The patient's intensive care unit (ICU) follow-up period begins with the return of spontaneous circulation after CPR. Unfortunately, despite the development of treatment options and guidelines, mortality and morbidity rates in post-CPR patients are still high (1). The most important reason for this is post-cardiac arrest syndrome, which includes systemic ischemia reperfusion injury, brain damage, myocardial dysfunction or severe organ failure (2). Many studies have been conducted examining factors affecting mortality and morbidity in this patient group. However, since it is a heterogeneous patient group, definitive data could not be revealed.

We retrospectively evaluated post-CPR patients admitted to ICU over in a one-year period. We aimed to obtain a descriptive analysis for this critical patient group.

Material and Methods

After approval of the ethics committee (the Ethics and Research Committee of Karabuk University, No:77192459-050.99-E.1826), this single-center, retrospective observational study was conducted in the mix ICU's at the Karabuk University Hospital in Karabuk, Turkey, from January 2023 to January 2024. It was carried out in accordance with the principles of the Declaration of Helsinki.

The medical records of post-CPR patients admitted to the ICU were reviewed. Exclusion criteria were: patients who were transferred from the operating room, patients stayed ≤24 hours; and patients with trauma.

Post-CPR patients are followed in line with the European Resuscitation Council and European Intensive Care Association 2015 post-resuscitation care guidelines in our ICU's.

The ICU was a 22-bed mix closed unit, and was staffed by anaesthesiologyst on a 24 hours per days, 7 days a week basis.

Using our hospital digital database, the post-CPR patients' demographic data (age, sex), comorbidities (cardiovascular, pulmonary, endocrine, neurological, and gastrointestinal diseases), Acute Physiology and Chronic Health Evaluation (APACHE) II score, Glasgow coma scores (GCS) and laboratory findings were recorded.

Moreover, throughout ICU follow-up the following parameters were also recorded: Requirement of mechanical ventilation (MV), duration of MV, requirement of vasopressors or renal replacement therapy (RRT), percutaneous endoscopic gastrostomy (PEG), tracheostomy, ICU Length of Stay, and ICU mortality.

Statistical Analysis

Analyses were performed on Statistical Package for Social Sciences (SPSS Inc., Chicago, IL) version 20.0 software. As descriptive statistics in the study; Mean ± standard deviation

(SD) values were given for quantitative data and frequency (n) and percentage (%) values were used in the evaluation of qualitative data. Normally distributed quantitative data were analyzed by "Independent T-test". Numerical variables that did not show normal distribution were compared using the "Mann-Whitney U test" between the two groups. On the other hand, categorical variables were analyzed using the Chi-square test. A p values lower than 0.050 were considered statistically significant.

Results

During the study period, a total of 1138 patients were acceptted to the ICU's during the study period. There were 101 post-CPR patients admitted to the ICU. A total of 23 patients were excluded due to: 12 patients that stayed ≤24 hours, 4 trauma patients, 3 patients transferred from the operating room, and 4 patients with missing data.

Thus, 78 (6.85%) patients were evaluated. The mean age of the patients was 75.01 ± 9.6 years, and 42 of them were female (53.84%). Demographic data, comorbidities APACHE II scores, GCS and laboratory findings of the patients are presented in Table 1.

Table 1. Baseline characteristics of the patients.

Age (years), mean ± SD		77.05± 11.25
Gender, n (%)	Female	42 (53.85)
	Male	36 (46.15)
APACHE II score, mean ± SD		25.15 ± 8.44
GCS, mean ± SD		8.29 ± 3.24
Lactate, mean ± SD		1.94 ± 1.26
LOS, mean ± SD		43.06 ± 40.40
Mortalitiy rate, n (%)		52 (66.67)

Definition of abbreviations: APACHE: Acute physiology and chronic health evaluation; GCS: Glasgow coma scores, LOS: Length of Stay. Data are presented as mean ± SD or n (%).

Comorbid diseases were present in 96.15% of the patients. The most common comorbidities were cardiovascular disease, diabetes mellitus, neurological disease, and respiratory disease.

The treatments and interventions applied in the ICU are summarized in Table 2.

Table 2. The treatments and interventions applied in the ICU.

	n (%)
Requirement of MV	74 (94.87)
Requirement of RRT	29 (37.18)
Requirement of vasopressors	57 (73.08)
Tracheostomy	21 (26.92)
PEG	22 (28.20)

Definition of abbreviations: MV: mechanical ventilation, RRT: renal replacement therapy, PEG:percutaneous endoscopic gastrostomy (PEG). Data are presented as n (%).

Out of these 78 patients, 26 (33.33%) patients survived, whereas 52 (66.67%) died in the ICU. The comparison of survivor and nonsurvivor patients is shown in Table 3.

Table 3. Comparison of demographic and clinical data between patients survivors and nonsurvivors.

	Nonsurvivors (n=52)	Survivors (n=26)	P-value
Age (years), mean ± SD	77.86±12.7	75.42±7.5	0.37
Sex, M/F(% male)	28/24	14/12	1.0
APACHE II, mean ± SD	27.27±8.4	20.92±6.7	0.001*
GCS, mean ± SD	6.87±2.6	11.15±2.2	0.000*
Lactate, mean ± SD	2.19±1.1	1.44±1.4	0.012*
LOS (days), mean ± SD	38.00±37.9	54.00±43.9	0.09
Comorbidities ≥ 3, n (%)	25 (48.07)	9 (34.61)	0.40

Definition of abbreviations: APACHE: Acute physiology and chronic health evaluation, GCS: Glasgow coma scores, LOS: Length of Stay, MV: mechanical ventilation, RRT: renal replacement therapy. Data are presented as mean ± SD or n (%). *P value <0.05 was considered significant.

Discussion

Patients whose respiration and circulation return through successful CPR are transferred to the ICU for additional treatment. Mortality rates were very high in post-CPR patients despite rapid-acting CPR and implementation of post-resuscitation care guidelines (1,3). In their epidemiological study, Grasner et al. reported that 30-day survival as 15% for post CPR patients (4). Uğur et al found the mortality rate for these patients to be 44% (5). We found this ratio to be 66.67%

Various factors that may influence mortality in post-CPR patients have been investigated. There are studies reporting that patient-related factors such as age, gender, and comorbid diseases may affect the outcomes (6-10).

Older age and male gender have been previously associated with poor outcome for these patients (7-9). However, the effects of age and gender on mortality in post-CPR patients are still controversial (5,10). In our study, there was no significant difference in terms of age or gender.

It has been reported in numerous studies that there is a relationship between the presence of comorbid diseases and mortality (11). Fabbri et al. stated that pre-arrest comorbidities were associated with mortality (12). Andrew et al. concluded that patients' existing comorbidities could be used to predict the prognosis of post CPR patients (13). However, in our study, there was no difference between groups. Comorbid diseases were present in 96.15% of the patients.

In the studies of Katırcıoğlu and Martinez, low GCS score was associated with poor outcome for these patients (11,14).

APACHE II score is an important prognostic indicator for patients followed in the ICU. We found that the GCS score was lower in nonsurvivor patients than in survivor patients. Our died patients had a higher APACHE II score.

Various laboratory data were also investigated in the studies (15). Hsu S and Wang C reported that increased lactate level was associated with poor outcome (16,17). The lactate levels was higher in our died patients.

The most important limitations of our study are its retrospective and single-center nature. The small number of cases and the lack of long-term follow-up of survivor patients are among the limitations of our study.

Conclusion

Post-CPR patients are a critical patient group monitored in the ICU. There are numerous factors that have been suggested to be prognostic for these patients, but previous studies have shown conflicting results. We found that the lactate levels, GCS, and APACHE II scores of survivors and nonsurvivors were statistically significantly different. However, for post-CPR patients, different laboratory and clinical parameters need to be evaluated in future studies. We think that it may contribute to the effective use of the limited number of ICU beds.

Conflict of interest

The authors have no competing interests to declare regarding the publication of this paper.

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