The effect of thoracic epidural analgesia on short-term outcome and mortality in geriatric patients undergoing open heart surgery

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ABSTRACT

BACKGROUND: In open-heart surgeries, many organ functions, particularly the respiratory system, are affected by post-operative pain, and so is mortality. Following open-heart surgery, geriatric patients have a higher risk of organ dysfunction and mortality. We aimed to compare the short-term outcomes and mortality of thoracic epidural analgesia (TEA) and intravenous (IV) analgesia in geriatric patients undergoing open heart surgery.

METHODS: This study included patients over the age of 65 who had open-heart surgery between 2010 and 2020. The patients were divided into two groups: Those who received TEA (Group E) and those who received IV paracetamol or tramadol or dexmedetomidine (Group I). The patients’ post-operative sedation and analgesia requirements, mechanical ventilation (MV) duration, blood glucose levels, liver and kidney function tests, complications, intensive care and hospital stay lengths, and mortality rates were all compared.

RESULTS: The study included a total of 548 patients, with 408 in Group E and 140 in Group I. As a result of the comparisons between the groups, sedation requirement, analgesia requirement, MV duration, post-extubation facial mask oxygen requirement, non-invasive MV need, re-intubation requirement, and blood glucose level were found to be lower in Group E than in Group I. Moreover, periods spent in intensive care and lengths of hospital stay were found to be lower in Group E than Group I. There was no difference found between the two groups in terms of hospital mortality.

CONCLUSION: In elderly patients undergoing open-heart surgery, TEA reduced the length of time in intensive care and hospital stays by improving the respiratory status and blood glucose regulation by supplying analgesia and sedation.

Keywords: Cardiac surgery; elderly; post-operative; thoracic epidural analgesia.

INTRODUCTION

Post-operative pain has an impact on many organ systems, particularly the respiratory system, and thus morbidity and mortality in open-heart surgeries. Patients who are unable to breathe comfortably due to pain may experience various respiratory complications, including atelectasis, in the post-operative period. Furthermore, by inducing humoral and neuroendocrine changes, catecholamine discharge caused by surgical stress and pain can affect the functions of organs such as the liver and kidney. The elasticity and compliance in the lungs decrease with age, while functional residual capacity and residual volume increase. As a result, more pulmonary dysfunction and complications can be observed in elderly patients after heart surgery. Similarly, systolic and diastolic functions of the heart, as well as catecholamine response, decrease with age. Renal blood flow and glomerular filtration decrease, and blood glucose regulation becomes difficult. As a result of all of these factors, geriatric patients could be more vulnerable to organ dysfunction and mortality after open-heart surgery.
Providing good post-operative analgesia can reduce both the surgical stress and the complications that may develop by suppressing the neuroendocrine response triggered by pain. When we examine the historical process, we can see that several modalities of analgesia have been used after open-heart surgery. The use of systemic IV analgesics is one of the oldest and widely used methods. For this purpose, opioids, sedative analgesics such as clonidine and dexmedetomidine, as well as other analgesics like paracetamol, have also been used extensively. In heart surgery, regional anesthesia/analgesia techniques are widely used for post-operative analgesia. Epidural analgesia, which is used in a variety of surgical and non-surgical procedures, is often used in heart surgery in conjunction with general anesthesia due to its beneficial effects on the cardiovascular system. Thoracic epidural analgesia (TEA) is considered as the "gold standard" for the analgesia after thoracic region surgery. It has been also shown that TEA has also several additional advantages which are related (e.g., decrease in atelectasis, improvement of post-operative, and also posttraumatic respiratory functions) and not related (e.g., decrease in postoperative atrial fibrillation and provide less intraoperative bleeding) to analgesia. TEA has been reported to improve ventricular function, minimize the risk of myocardial infarction, and reduce the development of rhythm disorders. The positive effects of TEA on postoperative morbidity and mortality have been reported in several studies in the literature. However, the number of studies investigating the effects of TEA on the geriatric patient population undergoing open heart surgery is few. Because of the large number of patients involved, the study presented in this article has the potential to make significant contributions to the literature.

The aim of this retrospective study is to investigate the effects of TEA on post-operative respiratory parameters, blood glucose levels, liver and kidney functions, and mortality in geriatric patients who will have open-heart surgery. In accordance with this purpose, post-operative sedation and analgesia requirements, mechanical ventilation (MV) duration, blood glucose level, liver and kidney function tests, complications, lengths of intensive care and hospitality stay, and mortality rates of the patients who underwent TEA were compared with systemic IV tramadol or paracetamol or dexmedetomidine analgesia.

**MATERIALS AND METHODS**

Ethical approval for this study (Ethical Committee 2020/182) was provided by the Ethical Committee Karadeniz Technical University, Faculty of Medicine, on July 6, 2020, and registered at [http://www.clinicaltrials.gov](http://www.clinicaltrials.gov) (NCT04708080). Patients who had open-heart surgery in our hospital between January 1, 2010, and December 31, 2020, were included in this study, which was intended as a retrospective study. The study was carried out by scanning patient files from the hospital archive. To achieve objective results, data records were carried out by individuals who were not participants in the study. Standard analgesia protocols are used for post-operative analgesia in all patients who have had open-heart surgery for a long time in the hospital where this study was performed. As an analgesic method, primarily TEA is used, and patients' analgesia is provided with TEA both in the intraoperative period and the post-operative period. However, patients are given fentanyl infusion during the intraoperative period if there are any contraindications for TEA, TEA procedure failure, or a shortage of necessary equipment or drugs for TEA.

In the post-operative period, one of the drugs tramadol, paracetamol, or dexmedetomidine is provided to these patients receiving IV analgesia.

Patients in the operating room receive sedoanalgesia with intravenous (IV) midazolam and fentanyl after electrocardiography, peripheral oxygen saturation, and non-invasive blood pressure monitoring are performed as standard. Then, using a Tuohy needle, an epidural catheter is inserted through the T5-T6 interval by experienced clinician. 15 µg adrenaline in 3–5 ml of 0.9% NaCl was administered to exclude IV insertion. After confirming the epidural catheter's position, a bolus of 25 mg/10 ml bupivacaine is administered, followed by a 3–4 ml/hour bupivacaine infusion from a 3 mg/ml solution, which is continued until the post-operative 48th h. The epidural catheter is removed at the end of the 2nd post-operative day, depending on the type of anticoagulant used on the patient, in compliance with standard protocols. Intraoperative 1 µg/kg/h fentanyl infusion is administered as an analgesic protocol to patients who do not receive TEA. For post-operative analgesia, on the other hand, one of the following three options is administered intravenously: 50 mg tramadol 4 times per day or 1 g paracetamol 3 times per day or 0.1–1 µg/kg/h dexmedetomidine infusion.

For anesthesia induction, patients are given 2–4 g/kg fentanyl, 3–6 mg/kg thiopental, and 1 mg/kg rocuronium. 1–3% sevoflurane in a 50% oxygen-air mixture is used to maintain anesthesia. Invasive blood pressure and nasopharyngeal temperature monitoring are undertaken after orotracheal intubation. The monitoring of anesthesia depth is provided by the bispectral index. After the procedure, all patients are transferred to the intensive care unit (ICU) as intubated, where MV is maintained. Patients in intensive care are administered a 1–2 mg infusion of midazolam for the first 2 h. The patients whose Richmond Agitation-Sedation Scale score were between +1 and +4 are given additional sedative drugs (midazolam and haloperidol). Patients with a numeric rating scale score of more than 4 are given additional analgesic medication (50 mg of tramadol or 1 g of paracetamol, or 50 mcg of fentanyl). Patients who have a PaO2 value of 70 mmHg in the blood gas and a SaO2 of more than 90% when breathing in pressure-supported spontaneous mode with 0.50 FiO2 and 5 cmH2O PEEP are extubated, and additional oxygen with face mask and other needs are met according to protocol. High-flow oxygen support is primarily provided with a face mask for spontaneous breathing, as per the protocols for patients.
RESULTS

In this study, it was found that a total of 1574 patients had undergone open-heart surgery between 2010 and 2020. A total of 1026 patients were not included in the study because 847 patients were younger than 65 years, 106 patients underwent very emergency surgery, 28 patients did not meet the inclusion criteria, and 45 patients’ data were not available. Consequently, 408 patients were included in the study as the epidural group (Group E) and 140 patients as the IV analgesia group (Group I) (Fig. 1).

The cardiopulmonary bypass and aortic cross-clamp duration of the patients were not significantly different. However, a significant difference was found between postoperative MV times, time spent in the ICU, and hospital stay (Table 2). The post-operative MV time in Group E (10.6±12.6 h) was found to be shorter than that of Group I (19.2±17.4 h). Concordantly, the time spent in the ICU (2.5±2.4 days) and the duration of hospitalization (7.3±3.8 days) in Group E has been found to be shorter than the time spent in the ICU (4.1±2.5 days) and the duration of hospitalization (10.5±6.6 days) in Group I (p<0.05 and p<0.01, respectively).

The preoperatively recorded data revealed no significant differences in terms of age, gender, BMI, EF, ASA, and EuroSCORE risk scores (Table 1). There was no significant difference between the groups in terms of comorbidity and types of surgery. However, in the PF test examinations, the FEV1/FVC (Forced Expiratory Volume in one second/Forced Vital Capacity) mean value of Group E (77.4±12.9) was found to be significantly lower than the mean value of Group I (81.5±10.9). Furthermore, the percentage of patients with FEV1/FVC ratio <70 in Group E (16.4%) was found to be higher than Group I (1.8%) (p<0.05, Table 1).

Significant differences were found between patients’ additional sedation and analgesic requirements. The percentage of patients in Group E who needed additional sedation (51 patients, 25%) was found to be lower than the percentage of patients in Group I (32 patients, 47.7%) (p<0.01). Similarly, the percentage of patients in Group E who received additional analgesics (132 patients, 32.3%) was statistically significantly lower than the percentage of patients in Group I (78 patients, 55.4%) (p<0.01, Fig. 2).
Post-operative blood glucose levels, liver, and kidney function tests all revealed some differences (Table 3). Blood glucose level in Group E (152.1±54.7 mg/dl) was found to be lower than that of Group I (181.5±49.0 mg/dl). While Group E had slightly higher creatinine (1.12±0.77 mg/dL), ALT (45.5±57.1 IU/L), and AST (91.2±78.5 IU/L) values than Group I creat-

| **Table 1.** Patient characteristics and surgery performed in the study groups |
|---------------------------------------------------------------|
| **Group I** (n=140) & **Group E** (n=408) & **p** |
| Age (years) & 72.1±6.1 & 71.7±4.1 & 0.227 |
| Gender (M/F) & 106/34 & 120/288 & 0.445 |
| BMI & 28.1±4.4 & 28.2±4.5 & 0.865 |
| ASA (I/II/III/IV/V) & 18/78/38/6 & 42/270/96/0 & 0.252 |
| EF (%) & 52.4±10.7 & 51.3±11.8 & 0.310 |
| Euro Score & 4.4±2.0 & 4.3±1.9 & 0.624 |

| Comorbidity, n (%) |
|---------------------|
| Hypertension & 118 (84.2) & 316 (77.4) & 0.14 |
| Smoking & 28 (20) & 52 (12.7) & 0.10 |
| Diabetus mellitus & 40 (28.5) & 108 (22.5) & 0.42 |
| Hypercholesterolemia & 18 (12.8) & 54 (13.2) & 0.55 |
| Previous stroke & 8 (5.7) & 14 (3.4) & 0.30 |
| Arrhythmia & 16 (11.4) & 60 (14.7) & 0.32 |
| Kidney function disorder & 14 (10) & 42 (10.2) & 0.51 |
| Chronic obstructive pulmonary disease & 24 (17.1) & 70 (17) & 0.57 |
| FEV1/FVC (%) & 81.5±10.9 & 77.4±12.9 & 0.015* |
| Patient with FEV1/FVC <70% n (%) & 10 (1.8) & 90 (16.4) & 0.025** |

| Type of cardiac procedure, n (%) |
|---------------------------------|
| Coronary bypass only & 112 (20.5) & 316 (57.6) |
| Valvular disease only & 8 (1.4) & 50 (9.1) |
| Aort aneurysm & 8 (1.4) & 6 (1) |
| Coronary bypass & valvular disease & 8 (1.4) & 30 (5.4) |
| Valvular + Aort aneurysm & 0 (0) & 2 (0.3) |
| Coronary bypass + Aort aneurysm & 2 (0.3) & 0 (0) |
| Coronary bypass + Valvular + Aort aneurysm & 2 (0.3) & 2 (0.3) |

*P<0.05 FEV1/FVC rate in Group E is lower than Group I. **P<0.05 Patients’ rate with FEV1/FVC rate <70% in Group E is higher than Group I. CABG: Coronary artery bypass grafting; BMI: Body mass index; ASA: American Society of Anesthesiologists; EF: Ejection fraction.

| **Table 2.** Patients’ preoperative and postoperative laboratory values (Mean±SD) |
|---------------------------------------------------------------|
| **Group I** & **Group E** & **p** |
| Preoperative aspartate aminotransferase (IU/L) & 30.46±23.87 & 32.2±47.1 & 0.55 |
| Postoperative aspartate aminotransferase (IU/L) & 79.62±77.92 & 91.2±78.5 & 0.44 |
| Preoperative alanine aminotransferase (IU/L) & 21.39±15.88 & 23.96±50.44 & 0.36 |
| Postoperative alanine aminotransferase (IU/L) & 35.07±52.1 & 45.5±57.1 & 0.35 |
| Preoperative creatinine (mg/dL) & 1.08±0.65 & 1.19±1.13 & 0.33 |
| Postoperative creatinine (mg/dL) & 1.07±0.71 & 1.12±0.77 & 0.26 |
| Preoperative glucose (mg/dl) & 120.7±49.6 & 127.4±56.9 & 0.22 |
| Postoperative glucose (mg/dL) & 181.5±49.0 & 152.1±54.7 & 0.03* |

*P<0.05 postoperative glucose value in Group E is lower than Group I. SD: Standard deviation.
tinine (1.07±0.71 mg/dl), ALT (35.07±52.1 IU/L), and AST (79.62±77.92 IU/L) values, this difference did not reach statistically significant levels (p>0.05).

When the post-operative complications of the two groups were compared, it was found that there were significant differences, particularly in terms of pulmonary functions. The proportions of patients who need additional oxygen support with a face mask because their breathing worsened after being extubated (113 patients, 27.7%), who need NIMV (31 patients, 7.6%), and who underwent reintubation (3 patients, 1.5%) were found to be lower in Group E than in Group I (51 patients, 36.2%; 16 patients, 23.2%; and 5 patients, 7.1%, respectively), (p<0.05), (Fig. 3).

There was no significant difference found between the groups in terms of infection development (e.g., pneumonia), hemodynamic data, development of the need for inotropic/vasopressor drugs, and fluid and blood products supplied. Both groups had comparable in-hospital mortality rates (p>0.05).

**DISCUSSION**

This study demonstrated that TEA offers better analgesia and sedation in open-heart surgery than systemic IV analgesics, enabling patients to be extubated sooner and reducing respiratory complications. By suppressing the post-operative stress response, TEA also helped to regulate blood glucose levels. TEA led to a decrease in the duration of stay in both the ICU and the hospital as a consequence of all of these positive outcomes. This study has the highest number of geriatric patients for cardiac surgery with TEA. Although several studies were conducted to investigate the effects of TEA on the geriatric patients in the literature,[19] no study has reached to our patients' number. Therefore, the results of this study have great importance.

After open heart surgery, deep breathing induces tension in the sternotomy area, resulting in intense pain. The patient, whose pain worsens as he breathes, begins to breathe more superficially to restrain the amount of pain he experiences. Atelectasis, infection, and other respiratory complications may arise as a consequence of this problem, resulting in worse outcomes regarding morbidity and mortality. In a retrospective analysis of 5798 patients who underwent cardiac surgery, Castillo et al.[4] reported that being over the age of 70 increases the risk of respiratory failure. TEA offers great post-operative analgesia, enabling patients to be extubated sooner and the duration of MV to be reduced. Moreover, it reduces the complications that may be caused by surgical pain and contributes positively to respiratory functions. In a recent study involving 90 patients who underwent coronary

| Table 3. | Data on surgical and postoperative periods (Mean±SD) |
|----------|-----------------------------------------------------|
|          | Group I (n=140) | Group E (n=408) | p       |
| Pump time (min) | 129.4±41.4 | 139.3±52.6 | 0.180   |
| ACC time (min)   | 81.7±35.5  | 86.9±41.1  | 0.316   |
| MV times (hours) | 19.2±17.4  | 10.6±12.6  | 0.021*  |
| ICU stay (day)   | 4.1±2.5    | 2.5±2.4    | 0.035*  |
| Hospital stay (day) | 10.5±6.6  | 7.3±3.8    | 0.008** |
| Hospital mortality | 6 (1%)     | 18 (3.2%)  | 0.632   |

*p<0.05 MV times and ICU stay in Group E are lower than Group I. **p<0.01 Hospital stay in Group E is lower than Group I. ACC: Aortic cross clamp; MV: Mechanical ventilation; ICU: Intensive care unit.

**Figure 2.** Postoperative respiratory complications. *P<0.05, NIMV requirement, oxygen requirement and re-intubation in Group E is lower than Group I. NIMV: Noninvasive mechanical ventilation.

**Figure 3.** Patients’ rate of additional sedative and analgesic drug requirement. *P<0.01 additional sedative and analgesic requirement in Group E are lower than Group I.
artery bypass graft surgery, Meena and Ranawat\cite{26} found that TEA administration offered better analgesia than IV fentanyl administration and that patients were extubated sooner. They also claimed that TEA improved patients' post-operative pulmonary functions by improving arterial blood gases value and peak expiratory flow rate. In the literature, there are several meta-analyses stating that TEA application has positive effects especially on respiratory functions and decreases respiratory complications.\cite{21,22,23} In a meta-analysis that included only randomized controlled trials, Zhang et al.\cite{23} reported that patients who underwent TEA were extubated sooner and had fewer respiratory complications. As a result of their examination on 69 randomized controlled trials involving 4860 patients in a meta-analysis conducted in 2019, Guay and Kopp found that TEA administration offered improved analgesia up to the 72th h postoperatively compared to systemic IV analgesia, reduced MV duration by allowing sooner extubation, and reduced the rate of respiratory complications.\cite{17} In our study, patients who received TEA required less additional analgesic, were extubated sooner, and spent less time on MV than those who received IV analgesia. After extubation, the positive effects of TEA on respiratory functions persisted, and the rate of mask oxygen and NIMV requirement and post-operative reintubation were shown to be lower in the TEA group than in the IV analgesia group.

In the literature, there are many studies demonstrating the positive effects of TEA administration on respiratory functions in the post-operative period using PF test parameters. To determine the effects of TEA on respiratory functions of patients over 65 years of age who undergone open-heart surgery, El-Morsy et al.\cite{24} administered only intravenously fentanyl to one group and TEA to the other. They found that aside from better analgesia and sooner extubation, patients who underwent TEA in the post-operative phase also had higher FVC and FEV1 values in PF tests. While all patients received pre-operative PF tests, routine PF tests are not administered in the post-operative phase at our hospital. Hence, we are unable to speculate on the effects of TEA on our patients' post-operative PF tests. However, having a weaker respiratory condition according to the pre-operative FEV1/FVC rates, the patients in the TEA community exhibited a better clinical course in the post-operative phase the fact that the TEA group needed less additional oxygen, NIMV, and reintubation after extubation than the IV analgesia group can be considered evidence of TEA's positive effects on respiratory functions.

Surgical stress and pain can increase sympathetic activity and cause neuroendocrine changes in patients, leading to increased morbidity and mortality. Catecholamine release suppresses insulin secretion and increases glycogenolysis, causing blood glucose to rise. In addition to its cardiac and respiratory benefits, it has been reported that TEA application reduces complications by suppressing the catecholamine and cortisol response associated with surgery.\cite{25} Zawar et al.\cite{1} reported that TEA administration suppressed the stress response and shortened the hospital stay in elderly patients undergoing cardiac surgery. In another study, it was reported that hyperglycemia has a significant impact on mortality, and insulin infusion for blood glucose regulation lowers perioperative complications and mortality.\cite{26} In our study, patients who received TEA needed less post-operative sedation than those who received IV analgesia, and their blood glucose levels were lower. We believe that better control of stress response and catecholamine discharge with epidural analgesia is the reason for the favorable situation for TEA in terms of blood glucose among groups with comparable DM and other comorbidities.

TEA administration may have some effects on hemodynamic functions, as well as vital organ functions such as the liver and kidney. Guay and Kopp reported that TEA raised the risk of hypotension, but there was no need for inotropic or vasopressor drugs, in a meta-analysis of 17 randomized controlled trials involving 870 patients.\cite{17} In our study, no differences in hemodynamic parameters or the use of inotropic/vasopressor drugs were observed between the groups. However, being within usual limits, blood pressure levels in the TEA group were lower than in the systemic analgesia group, but not statistically significant. By influencing organ perfusion, a drop in blood pressure has the potential to impair liver and kidney functions. In our study, creatinine, ALT, and AST values in epidural group were slightly higher than in the systemic IV analgesia group, but the difference was not statistically significant. This situation reveals the fact that TEA administration should be closely monitored in terms of organ perfusion.

TEA has the potential to improve patient clinical outcomes and reduce the duration of stay in the ICU and hospital with its beneficial effects on respiratory processes and stress response.\cite{10,27} In a study of patients who undergone heart surgery, Bracco et al.\cite{28} reported that using TEA reduced the duration of stay both in the intensive care and hospital by reducing post-operative complications, and provided a reduction in the costs of patients. We were unable to calculate the cost of our patients. However, the fact that TEA-applied patients spent less time both in the ICU and the hospital can be considered an advantage.

In this study, both groups had comparable mortality rates. Apart from meta-analyses claiming that TEA decreases mortality, there are also studies claiming that it has no impact in the literature.\cite{22,23,29} The number of studies claiming that less invasive procedures such as erector spinae plane block and pectoral nerve block can be used in cardiac surgery for analgesic purposes is increasing by the day, based on the thesis that TEA application has no beneficial impact on mortality and has significant side effects such as epidural hematoma.\cite{20,31} These practices are promising, but they will need to be implemented more widely and more studies conducted to truly show their efficacy. In our TEA applications, which we conducted according to guideline of the neuraxial block in the patient receiving...
antithrombotic or thrombolytic drugs \[32\] no clinically significant hemorrhagic complications were observed.

This study, in which we emphasized the advantages of TEA in open-heart surgery, has some limitations. First and foremost, this is a retrospective study that spans a long period of time, about 10 years. Various anesthesia and surgery teams were involved in the surgical processes of the patients during the course of this long period. In the processes of analgesia applications, MV and extubation, and discharge from intensive care and the hospital, it has been difficult to reach a strict standard with objective criteria. Other limitation of the study is that the groups did not include equal numbers of patients. Another limitation is that some patients were excluded from the study if all records for the study period could not be accessed and if it was found that all analgesia methods were used simultaneously.

Conclusion

It was seen in this study that TEA offers better analgesia and sedation in open-heart surgery, improves respiratory status by reducing the duration of MV and respiratory complications, and makes a positive contribution to the regulation of blood glucose levels. TEA also reduced the duration of stay in both the ICU and hospital. We believe that TEA application contributes significantly to clinical outcomes in open-heart surgery, on the condition of being conducted by experienced anesthesiologists and vital organ functions are closely monitored.

Informed Consent

The study complies with the current ethical considerations. None of the authors has any conflict of interest, financial or otherwise. All participants provided informed consent in the format required by the relevant authorities.

Ethics Committee Approval: This study was approved by the Karadeniz Technical University Scientific Research Ethics Committee (Date: 09.07.2020, Decision No: 424).

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Açık kalp cerrahisi olan geriatrik hastalarda torasik epidural analjezinin kısa dönem sonuc ve mortalite üzerine etkisi

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AMAC: Ameliyat sonrası ağız, açık kalp ameliyatlarında solunum sistemi bağı olmak üzere birçok organ fonksiyonlarına ve mortaliteye etkiler. Geriatri hastalar açık kalp cerrahisi sonrası daha fazla organ disfonksiyonu ve mortalite riski artırdır. Açık kalp cerrahisi geçiren geriatri hastalarda torasik epidural analjezi (TEA) ve intravenöz analjezinin kısa dönem sonuçlarını ve mortalitesini karşılaştırmayı amaçladık.

GEREC VE YÖNTEM: Bu çalıştarya 2010–2020 yılları arası açık kalp cerrahi geçiren 65 yaş üstü hastalar alınmıştır. Hastalar torsozal epidural analjezi uygulanır (Grup E) ve intravenöz parasetamol veya tramadol veya deksametomidin uygulanır (Grup I) olmak üzere iki gruba ayrıldı. Hastaların ameliyat sonrası sedasyon ve analjezi gerekenlerini, mekanik ventilasyon süreleri, kan glukoz düzeyi, karaciğer ve böbrek fonksiyon testlerini, gelişen komplikasyonlar, yoğun bakım ve hastanede kalış süreleri ve mortalite oranları karşılaştırılır.

BULGULAR: Çalıştaya 408’i Grup E, 140’ı Grup I olmak üzere toplam 548 hasta dahil edildi. Gruplararası karşılaştırımlar sonucunda sedasyon gerekenlerin, analjezi gerekenlerin, mekanik ventilasyon süreleri, ekstübasyon sonrası yüz maskesi oksijen gerekenleri, noninnizvaz mekanik Grup E’de ventilasyon ihtiyaçları, yeniden entübasyon gerekenleri ve kan şekeri düzeyi Grup E’de görülmesi daha düşük bulundu. Ayrıca yoğun bakım ve hastanede kalış süreleri Grup E’de Grup I’de görülen daha düşük bulundu. Hastane mortalitesi açısından iki grup arasında fark bulunmamı.

TARTIŞMA: Torasik epidural analjezi, açık kalp cerrahisi geçiren yaşlı hastalarda olusтурduğu analjezi ve sedasyon ile daha iyi solunumal durum ve kan şekeri regulasyonu sağlayarak yoğunbakanım ve hastanede kalış süresini kısaltmıştır.

Anahtar sözcükler: Ameliyat sonrası, kalp cerrahisi, torsozal epidural analjezi, yaşlılık.

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