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Klinik Çalışma

Combined Spinal-Epidural Anesthesia or Local Anesthesia + Sedoanalgesia in Abdominal Aortic Aneurism Repair?

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SUMMARY

Objective: *Anesthesia for the repair of abdominal aortic aneurism can be performed with different modalities of anesthesia or their combinations. The risk level for the morbidity and mortality of the patients, is increased in geriatric patients with the existence of accompanying pathology. To compare two different anesthesia methods (local anesthesia and sedation vs combined spinal and epidural anesthesia) for the repair of endovascular aneurism in a geriatric patient.*

Material and Methods: *16 high risk geriatric patients were included in the study. The parameters of 16 high risk patients who underwent elective or emergency treatment for endovascular aneurism were included. Group-I (n:8) was given local anesthesia and sedation, Group-II (n:8) was given combined spinal and epidural anesthesia. Intraoperative and postoperative hemodynamic parameters were reviewed and analyzed. The demographic data of the two groups ressembled each other.*

Results: *The complication rate was calculated at an average of 6.25%, which was considered insignificant (p>0.05). There was no significant difference between the duration of hospital and intensive care unit stay for the two groups (p>0.05).*

Conclusion: *Combined spinal and epidural anesthesia requires much more experience, but it is safer than local anesthesia and sedation for endovascular aneurism patients.*

Key words: *abdominal aort aneurism, endovasculary surgery, high cardiac risk, combined spinal epidurally anesthesia, local anesthesia*

ÖZET

Abdominal Aortik Anevrizma Tamirinde Kombine Spinal Epidural Anestezi mi ya da Lokal Anestezi + Sedoanaljezi mi?

Amaç: *Abdominal aort anevrizması tamiri için farklı anestezi modaliteleri ya da kombinasyonları uygulanabilir. Geriatrik hastalarda eşlik eden patolojiler varlığından dolayı mortalite ve morbidite riski artmıştır. Çalışmamız geriatrik hastalarda endovasküler anevrizma tamiri için seçilebilen iki farklı anestezi metodunu karşılaştırmayı amaçlamıştır.*

Gereç ve Yöntem: *On altı yüksek riskli geriatrik hasta çalışmaya dâhil edildi. Elektif ya da acil olarak endovasküler anevrizma operasyonu olacak 16 yüksek riskli hastanın parametreleri çalışmada kullanıldı. Grup-I (n: 8)'e lokal anestezi ve sedasyon uygulanırken, Grup-II'ye ise kombine spinal epidural anestezi uygulandı. İntraoperatif ve postoperatif hemodinamik parametreler gözlendi ve kayıt altına alındı. İki grubun demografik özellikleri birbirlerine uyumlu idi.*

Bulgular: *Komplikasyon oranı ortalama olarak %6.25 ve anlamlı olarak bulunmadı (p>0.05). Hastanede ve yoğun bakımda kalma oranında ise iki grup arasında ise önemli bir fark bulunmadı (p>0.05).*

Sonuç: *Kombine spinal ve epidural anestezi daha çok tecrübe gerektirir ama lokal anestezi ve sedasyondan endovasküler aort anevrizması hastaları için daha güvenlidir.*

Anahtar kelimeler: *abdominal aort anevrizması, endovasküler cerrahi, yüksek kardiyak risk, kombine spinal epidural anestezi, lokal anestezi*

INTRODUCTION

AAA (Abdominal aortic aneurism) is the most frequently seen aortic pathology. Aneurism is defined as a localized permanent arterial dilatation causing an increase of more than 50% of the normal diameter. If untreated, a progressive aneurism can cause rup-

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ture and even death [1]. AAA is seen at a rate of 25 % among all and 8% among geriatric male population over 65 years of age [1,2]. The greatest risk factor (80%) among those patients is smoking and atherosclerosis is shown as the main cause of aneurysm in consideration of a defect in fibrin 1 gene and type III procollagen as well. The general therapy for AAA comprises repair techniques using abdominal surgery. Recently minimal invasive techniques are becoming popular as alternative to traditional surgery. Endovascular procedures are less traumatic and better alternatives especially in geriatric high risk patients having concomitant diseases. In this procedure, an endovascular stent is placed in the grafted aneurysm under fluoroscopy usually in angiography units by a team of cardiovascular surgeon and anesthetists [3-5]. The advantages of this procedure are its being less invasive, diminished blood loss, lack of abdominal incision and aortic clamping, rapid recovery and decrease in hospital stay and lower morbidity rates [6-8]. Still, many perioperative complications may occur such as rupture of the aneurysm, and dislocation of the stent graft [8,9].

In high risk geriatric patients, anesthesia has to be performed in fully equipped operating theater conditions. Nevertheless, the endovascular repair of the abdominal aortic aneurism requiring major surgery is sometimes performed in angiography units which are not fully equipped. The presence of concomitant disease increases the risk of morbidity and mortality in these patients. In this study, we compared local anesthesia with sedation and the combined spinal-epidural anesthesia (CSEA) techniques in high risk geriatric patients undergoing endovascular aneurysm repair.

MATERIALS and METHODS

After receiving confirmation from the Ethics Committee, files of 16 high risk geriatric patients who had undergone either elective or emergency repair of aortic aneurysm between the years 2011 and 2012 were included in the study. Firstly, age, ASA classification, and euroscores of the patients were determined. Patients aged over 65 years of age with ASA III class having euroscore over 5 were included. Two patients under 65 years of age were excluded from the study. The parameters of the 16 patients, such as age, gender, ASA classification, EF, hemodynamic values, duration of operation, and anesthesia, amount of crystalloid, colloid, erythrocytes and FFP infused, urinary output, inotropic, and/or vasodilator use and complications were reviewed. Also, preoperative and postoperative blood sugar, urea, Hb, Htc values, length of stay in the intensive care unit, causes of comorbidity, anesthesia procedure applied, and values measured at control visits performed on the postoperative first and sixth months, morbidity, endoleak and mortality rates were recorded. The files were divided into two groups according to the method of anesthesia used. Group I (n:8) received local anesthesia and sedation, while for Group II (n:8) CSEA was used.

The angiography unit of cardiology clinic was used for EVAR applications. All the cases did not receive anything by mouth for six hours before the EVAR application and midazolam 0.07 mg/kg was used for premedication 45-60 minutes before the procedure. Patients were transported first to the operating theater one hour earlier for monitorization with three electrode ECG, SpO_2 and NIBP with an 18 gauge cannula used for the IV line. According to our clinical procedures, for those who will undergo combined spinal-epidural catheterization (Espocan, Docking system, perfix Soft Tip/BrauN) to the L3-4 interspinal space, 15 mg bupivacaine heavy (Marcaine) was administered. In all the cases, radial artery catheterization was performed on the non-dominant arm for opening an arterial line and performing blood gas analysis.

After checking the arterial line, the transducer was placed in the mid-axillary line and zeroed to atmospheric pressure. Under local anesthesia, a central venous cannula was placed into the right internal jugular vein to measure CVP. Then all patients received nasal oxygen (5 Lt/min). Patients undergoing the operation with local anesthesia and sedation were given a local anesthetic to the incision line by the surgeon. For sedo-analgesia 0.025 mg/kg IV midazolam and 1 μg/kg IV fentanyl were administered.

During the procedure, fluid requirement, diuresis and blood loss were monitored. Mean arterial pressure and CVP were kept at 50-60 mmHg, and 5-10 mmHg, respectively. Upon the request of the surgeon, 5.000 U heparin was given IV and ACT was kept over 250. In none of the cases protamine was needed. Regarding the hemodynamic parameters, perlinganite

infusion was used for all patients to prevent hypertensive attacks and to place the stent more easily. All patients were transported to the cardiovascular intensive care unit as soon as they were stable hemodynamically and changes in their hemodynamic status and postoperative pain therapy were monitored..

STATISTICAL ANALYSIS

All statistical evaluations were performed using the Statistical Package for Social Sciences (SPSS) for Windows (version 18.0). Descriptive statistics were performed (frequency, mean and standard deviation) after performing data control. Mann–Whitney U test, which is a test in the comparative analyses between the two independent groups, was applied. Chi-Square ($\chi 2$) test was used to compare categorical variables.

Table 1. Demographic characteristics, presence of concomitant disease, EF values.

Variables	Group I (LA+sedation) (n=8)	Group II (CSEA) (n=8)	p value
	Mean±Standard deviation, Frequency (%)		
Gender			
Women(n=2)	1, 12.5%	1, 12.5%	
Men (n=14)	7, 87.5%	7, 87.5%	1*
Age	73.9±5.5	74.3±4.2	1*
ASA III (%)	8, 100%	8, 100%	1*
EF (%)	42.5±4.6	39.4±4.2	0.19*
DM			
No	5, 62.5%	3, 32.5%	1.0**
Yes	3, 37.5%	5, 62.5%	
HT			
No	1, 12.5%	1, 12.5%	1.0**
Yes	7, 87.5%	7, 87.5%	
COPD			
No	5, 62.5%	1, 12.5%	1.0**
Yes	3, 37.5%	7, 87.5%	
CAD			
No	6, 75.0%	6, 75.0%	1.0**
Yes	2, 25.0%	2, 25.0%	
CVD			
No	1, 12.5%	1, 12.5%	1.0**
Yes	7, 87.5%	7, 87.5%	
CABG			
No	5, 62.5%	6, 75.0%	0.59**
Yes	3, 37.5%	2, 25.0%	
DM+ HT			
No	5, 62.5%	3, 37.5%	0.37**
Yes	3, 37.5%	5, 62.5%	
COPD+CVD			
No	5, 62.5%	2, 25.0%	0.13**
Yes	3, 37.5%	6, 75.0%	

**Mann Whitney U test **chi-square analysis*
Variables: ASA, American Anesthesia Association Classification; EF, Ejection fraction; DM, Diabetes Mellitus; HT, Hypertension; COPD, Chronic obstructive pulmonary disease; CVD, Cerebrovasculary disease; CABG, coronary artery bypass graft.

All statistical analyses were performed, and evaluated within a 95% confidence interval (CI).

RESULTS

The files were divided into two groups according to anesthesia type. Group I (n:8) comprised those who received local anesthesia and sedation and Group II (n:8) those who were given CSEA. Fourteen (87.5%) cases were male and two (12.5%) were female. All the cases were of ASAIII, with a high cardiac risk and a euroscore of over 5 points. Regarding their medical history and risk scores, the patients had diabetes mellitus (n:8; 50%), hypertension (n:14; 87.5%) COPD and history of smoking (n:95; 6.2%), and coronary artery disease (n:4:25.0%). One case had a history of abdominal surgery. Eight cases (50%) were both diabetic and hypertensive. Two cases (13.3%) had coronary artery disease and cerebrovascular disease. The mean EF was measured at 40.9% during preoperative transthoracic echocardiography (TEE). Demographic characteristics of the two groups, ASA classification, the presence of concomitant disease, and EF values were found to be statistically insignificant (p>0.05) Table 1.

Table 2. Intraoperative parameters data.

Intraoperative variables	Group I (LA+sedation) (n=8)	Group II (CSEA) (n=8)	p value
	Mean±Standard deviation, number (%)		
Additional surgical intervention			
Yes	7, 87.5%	8, 100.0%	
No	1, 12.5%	0, 0.0%	0.30**
Operation duration (min)	116.3±11.9	120.7±13.2	0.62*
Anesthesia duration (min)	126.3±11.9	126.6±13.2	0.66*
Emergency intervention			
No	8, 100.0%	8, 100.0%	-
Yes	0, 0.0%	0, 0.0%	
Total crystalloid fluid (ml)	1362.5±350.3	1462.5±277.4	0.53*
Total colloid fluid (ml)	433.3±81.7	428.6±48.8	0.75*
Total ES (unit)	2	2	1.0*
Total FFP (unit)	2	1	1.0*
Urinary output (cc)	475.0±116.5	550.0±92.6	0.14*
Inotropic use			
No	8, 100.0%	6, 75.0%	0.13**
Yes	0,0.0%	2, 25.0%	
Vasodilatator use			
No	6, 75.0%	8, 100.0%	0.61**
Yes	2, 25.0%	0, 0.0%	
Complication	-	-	-
No	7,87.5%	-	
Yes	1, 12.5%	-	

**Mann Whitney U test, ** Chi-square analysis, FFP, fresh frozen plasma; ES, Erythrocyte suspension.*

Differences between the two groups were statistically insignificant for the intraoperative parameters; such as duration of operation and anesthesia, urinary output, use of inotropic-vasodilator, total crystalloid and colloid, eythrocytes, and FFP infusions (p>0.05). Additional surgical intervention and complication rates differed between two groups (Group 1, 12.5% and Group 2, 6.25%,. The intraoperative parameters are shown in Table 2.

Differences between the two groups as for laboratory parameters, pre- and postoperative blood glucose, urea, hemoglobin, hematocrit, hospital stay and intensive care unit stay were found to be statistically insignificant (p>0.05) Table 3.

Table 3. Laboratory parameters and postoperative values.

Variables	Group I (LA+sedation) (n=8)	Group II (CSEA) (n=8)	p value
Pre op blood glucose	94.8±10.6	93.8±5.8	0.96*
Post op blood glucose	131.3±11.7	121.9±19.3	0.97*
Pre op urea	31.3±6.4	30.0±13.9	0.34*
Post op urea	40.4±6.5	45.0±17.1	0.87*
Pre op hemoglobin (mg/dL)	12.3±1.7	11.77±2.3	0.584*
Post op hemoglobin (mg/dL)	10.6±0.1	10.2±0.2	0.860*
Pre op hematocrit (%)	37.0±5.2	35.9±5.0	0.653*
Post op hematocrit (%)	31.9±2.7	31.1±1.3	0.854*
Stay in intensive-care (days) (median)	1	1	1.0*
Hospital stay (days)	3.5±1.0	3.2±0.9	0.23*

**Mann Whitney U test, ** Chi square analysis.*

DISCUSSION

The fact that EVAR applications are used especially in high risk patients (older age, diabetes, hypertension, coronary artery disease, renal disease, and chronic obstructive pulmonary disease) means that anesthetic and surgical risks are higher. Among the cardiac risk patient groups EVAR applications are open to regional and local anesthesia [10,11]. In our retrospective study with high risk patients, we compared local anesthesia with sedation and combined spinal-epidural anesthesia. In the literature, there are some studies about use of regional anesthesia but there is no study comparing combined spinal-epidural anesthesia with local anesthesia and sedation used for EVAR interventions [2-4]. There are only few case reports [12]. A report of 21 cases of EVAR over two years was published in 1997 by Aadahl et al., who used combined spinal-epidural anesthesia [13]. In that study, it was found that CSEA could be used in high risk cases which demonstrated improved results regarding haemodynamic stability and early mobilization. That study was similar to ours, but it had no control group or data from the intraoperative and postoperative periods. Besides, two invasive interventions were performed in all cases. (Spinal block and epidural catheter were used in two different locations). The material and methods were also different.

In line with the increase in EVAR applications, the safety of the type of anesthesia for the patient, surgical team and anesthetist, and also their comfort have improved, and its risk rates have decreased [4-9,14]. In particular, CSEA has to be performed in the operating room before the operation and the patients should be followed carefully. Moreover, this technique brings together the advantages of both methods by providing rapid and safe onset, the possibility of extending anesthesia duration by epidural catheter, reduced side effects (due to low dosage), faster mobilization, and improved postoperative pain management [4-6,13].

Despite these advantages, this technique is not routinely used in EVAR applications, especially among high-risk geriatric patients [4,5]. In our clinic, in the EVAR anesthesia protocol, patients on whom CSEA will be performed are transported to the operating room one hour before the procedure. All patients are monitored thrice by ECG, SpO_2, and IBP arterial cannulation in the left hand artery, and CVP line in the right internal jugular vein. The radial arterial cannula was inserted into the radial artery of the non-dominant left hand for real-time arterial blood pressure monitorization and blood gas analysis.

Generally, repair of endovascular aneurysm is performed with general anesthesia, regional block or local anesthesia and sedation. In the choice of anesthesia method, the general state of the patient and surgical technique are also important. Betex et al, reported that local anesthesia with EVAR procedure in high risk patients for cardiac complications provides better hemodynamic stability and requires less inotropic agents and extra fluid [1,2]. Studies with local anesthesia and sedation have shown that the need to switch to general anesthesia, insufficient analgesia, intraope-

rative and postoperative pain, stress and lack of patient comfort and especially, in the retroperitoneal approach, respiratory insufficiency, the need for TEE use, prolonged surgical operation, and refusal of regional block by the patient favored general anesthesia [1,2].

General anesthesia can delay recovery, particularly in patients with respiratory problems, and increases the risk of pulmonary complications [12,14,15]. Spinal anesthesia is preferred to general anesthesia in endovascular operations, especially, in patients with concomitant pulmonary or cardiac pathologies, because of the prevention of tracheal intubation and surgical stress reaction, decrease in the inflammatory response, non- requirement for mechanical ventilation, and possibility of postoperative pain management. A continuous or epidural block without catheter, spinal block or spinal-epidural combined block can be used [13,14,16]. In order to decide between epidural, spinal and combined spinal and epidural blocks, it is necessary to pay attention to the time interval between heparinization and the block to prevent epidural hematomas. Regional block can be performed at the latest two hours before heparinization. Earlier heparinization increases the risk of hematoma [1,2].

The vascular structure throughout the body should be also considered before AAA operation because cerebral, cardiac, respiratory, metabolic and renal pathologies are most frequently seen in this kind of patients, which makes the use of endovascular surgery an alternative to open abdominal surgery. Besides being less invasive, it has the advantages of reduced occlusion and hemodynamic and metabolic stress along with early hospital discharge [13,14].

The additional need for sedation and analgesia during the intraoperative and the postoperative period for Group I negatively affected both patient and surgeon comfort.

In this study, we used CSEA technique for the induction of anesthesia, analgesia and sedation during the postoperative period. CSEA requires prior patient knowledge, with a through physical examination, familiarity with medical history and addictions, awareness of drugs. ECG, opening an arterial line (usually through the left radial artery). Besides monitorization of CVP from the right internal jugular vein, SpO_2, ACT and blood gas analysis should be performed. During the postoperative period, ACT and blood gas analysis, and heparin use should be monitored carefully. Endoleak is the most frequently encountered complication (11-44%) following endovascular grafting and involves continuity of blood circulation in the vessel [5,15]. In our study endoleak was seen in 12.5% of our patients, similar to that reported in the literature.

Gunes et al compared conventional and endovascular surgery performed for the repair of abdominal aortic aneurysm, and retrospectively analyzed 150 patients undergoing elective EVAR and conventional operations for AAA [9]. The mortality rate during early postoperative period, duration of operation, blood loss, need for blood transfusion, length of mechanical ventilation, hospital and intensive care stays were recorded. In this study, the secondary intervention rate in EVAR patients was found to be higher in the conventional surgical group. EVAR patients needed less blood and FFP than the conventional surgical group. While length of operation, mechanical ventilation and stay in intensive care unit and in the hospital were reduced. That is why EVAR is preferred by both the surgeons and patients and thus offers an alternative to the conventional surgery. In the same study, it was also reported that for conventional surgery general anesthesia was used for all patients (100%) while for EVAR, epidural, general anesthesia, and local anesthesia were used for 23.4. 41.7, and 29% of the patients, respectively. The postoperative mortality rate was 1.9% in EVAR and 9.3% in the conventional surgery group. In our study, no mortality was observed during one-year follow-up period. In one case, endoleak was detected and corrected with an additional aortic extension after balloon dilatation. The additional surgical intervention and complication rate was 6.25% in all our cases. We think that the complication rate was lower because we did not use conventional surgery.

In conclusion, we have found that CSEA is more comfortable and safe than local anesthesia and sedation in EVAR operations performed for high risk geriatric patients.

CONFLICT OF INTEREST

The authors has no financial, personal or any other conflict of interest.

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