



Continuous Spinal Anaesthesia for Endovascular Repair of Abdominal Aortic Aneurysm in High-Risk Patient

Yüksek Riskli Hastada Abdominal Aort Anevrizmasının Endovasküler Tamiri İçin Sürekli Spinal Anestezi

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Endovascular aneurysm repair (EVAR) is increasingly being used in abdominal aortic aneurysm (AAA) treatment, as it is less invasive than open surgery. A wide range of anaesthetic types, such as general anaesthesia, neuroaxial blocks and local anaesthesia, have been shown to be appropriate for the EVAR procedure. In the continuous spinal anaesthesia (CSA) method, the local anaesthetic may be titrated through a catheter placed in the subarachnoid space, allowing better control of the anaesthetic level and a reduction in potential haemodynamic side effects. Our aim is to present CSA as a successful anaesthetic technique for EVAR in an AAA patient with severe co-existing diseases.

Keywords: Abdominal aortic aneurysm, endovascular repair, continuous spinal anaesthesia, high-risk patient

Endovasküler aneurizma tamiri (EVAR), abdominal aort aneurizmalarının (AAA) tedavisinde açık cerrahiye oranla daha az invazif olması nedeniyle giderek daha fazla oranda uygulanmaktadır. Genel anestezi, nöroaksiyal bloklar ve lokal anestezi gibi çeşitli anestezi tiplerinin EVAR için uygunluğu gösterilmiştir. Sürekli Spinal Anestezi (SSA) tekniğinde, lokal anestetikğin subaraknoid alana iletilmiş bir kateter yoluyla titre edilerek verilmesi, anestezi seviyesinin daha iyi kontrolüne ve olası hemodinamik yan etkilerin azalmasına neden olabilir. Biz de ciddi yandaş hastalıklara sahip AAA olgumuzda, EVAR için başarılı bir anestezi tekniği olarak SSA uygulamamızı sunmayı amaçladık.

Anahtar Kelimeler: Abdominal aort aneurizması, endovasküler onarım, sürekli spinal anestezi, yüksek riskli hasta

Introduction

Endovascular aneurysm repair (EVAR) has become a first-line treatment option for patients with abdominal aortic aneurysm (AAA) (1). In addition to being less invasive than open surgery, it has been determined to provide an opportunity to reduce perioperative mortality and morbidity due to the use of local or regional anaesthesia, especially in high-risk patients (2, 3).

Various anaesthetic methods for EVAR have been determined in the literature. However, there are insufficient data on continuous spinal anaesthesia (CSA) use for EVAR. Our aim is to present CSA as a successful anaesthetic technique for EVAR in an AAA patient with severe co-morbid diseases.

Case Presentation

A 70-year-old male patient (weight: 68 kg, BMI: 22 kg m⁻²), who was hospitalised in the pulmonary diseases service due to shortness of breath and air hunger, was diagnosed with abdominal aortic aneurysm after thoraco-abdominal CT imaging, and EVAR was planned. With a history of hypertension, congestive heart failure and chronic obstructive pulmonary disease (COPD, sufferer from 25 years), the patient had a smoking habit one of 1 pack day⁻¹ for 50 years. The physical examination showed rough respiratory sounds bilaterally and prolonged expiration. Pulmonary function test revealed forced expiratory volume in 1 second (FEV₁): 0.69 L (25% of the predicted value), force vital capacity (FVC): 1.41 L (48% of the predicted value) and FEV₁/FVC: 49%. ECG showed atrial fibrillation, echocardiography showed that left ventricle segmental wall motion was abnormal, ejection fraction was 25%-30%, tricuspid insufficiency was 3° and pulmonary artery pressure was 45 mm Hg. Urea and creatine levels were slightly higher than normal (65 mg dL⁻¹ and 0.9 mg dL⁻¹, respectively), haematocrit level was 46.7% and white cell count was 11,800 mm⁻³. Arterial blood gas analysis gave the following results: pH: 7.41,

SO₂: 89%, PCO₂: 48 mmHg and PO₂: 52.3 mmHg. The patient was accepted to be in the American Society of Anesthesiologists (ASA) IV physical risk group.

Continuous spinal anaesthesia was planned because of the patient's advanced respiratory and cardiac problems. No premedication was administered, other than the anti-hypertensive and bronchodilator medications. In the angiography room, after initial controls of the patient with ECG, peripheral oxygen saturation (SpO₂) and non-invasive blood pressure monitoring (NIBP), lactated Ringer's solution infusion was begun. In the sitting position, with respect to local sterilisation, at the L3-4 intervertebral interval, 2 mL 2% lidocaine was administered for local anaesthesia. With a continuous spinal set (Spinocath, B. Braun, Melsungen, Germany), an epidural needle was inserted with a median approach, and it was placed 7 cm into the epidural space using the loss resistance to air method. Within the epidural needle, a 27 G spinal needle was used to pass through the dura, and after free flow of cerebro-spinal fluid was observed, a 24 G catheter was placed 1.5-2 cm into the cephalic side of the subarachnoid space. After a filter was connected and the catheter was fixated to the skin, the patient was moved to a supine position. About 1 hour later, 1 mL (5 mg) 0.5% levobupivacaine (Chirocaine 0.5%, 10 mL vial Abbott, Norway), diluted with 1 mL saline (2 mL 0.25% levobupivacaine), was administered through the spinal catheter. Sensory block was assessed as complete loss of pinprick sensation (22-gauge hypodermic needle). The patient was evaluated about 10 minutes after the administration was established, and if it was not at the T10 level, an additional dose of 0.5 mL 0.5% levobupivacaine, diluted with 0.5 mL saline, was administered. After a total of 7.5 mg levobupivacaine provided sensorial nerve block at the T10 level, the patient was taken to the angiography room, and 0.05 mg kg⁻¹ midazolam was given. After 5-lead ECG, SpO₂ and end-tidal CO₂ measurement, in addition to blood pressure monitoring, using a 20 G catheter for intra-arterial cannulation, central vein catheterisation and urinary catheterisation, the operation began. The procedure was completed in an interventional angiography room using a C-arm angiography device (INFX-8000C Toshiba Medical Systems, Tokyo, Japan). The left femoral artery and the right femoral artery were prepared by opening with a vertical incision. After heparinisation and placement of appropriate catheters from the left within the 18 F sheath, the main-body stent-graft (W.L. Gore&Associates, Inc. Flagstaff, Arizona, USA) was opened beneath the renal arteries. Leg grafts and necessary extensions were placed. Placement of the graft was confirmed and contrast material leakage from the aneurysm sac was checked (endoleak) with control angiography, the sheaths were removed, and the procedure was ended.

The procedure lasted 100 minutes, and no additional anaesthesia was required. Then, 10,000 IU of heparin was neutralised with 10,000 IU protamine HCl intraoperatively. A total

of 1500 mL crystalloid was given, and there was about 300 mL of blood loss during procedure. After the procedure was ended, the patient was transferred to the ICU. For postoperative analgesia, 1 mg kg⁻¹ iv tramadol was used. After a normal bleeding-clotting profile (ACT, INR and aPTT values) was observed, about 5 hours after heparin administration, the spinal catheter was removed. No complications developed during follow-up, and he was transferred from the ICU to the ordinary ward on the first day of the procedure.

Discussion

In this case report, we present the use of CSA as an appropriate anaesthetic method for EVAR repair of AAA in a patient with serious respiratory and cardiac risks.

The studies about the effects of anaesthetic type on EVAR results are limited. A multi-centre study (EUROSTAR) of 5557 patients evaluated the effects of regional and general anaesthetics in EVAR patients. While the regional anaesthesia group included high-risk patients, this group had fewer complications than the general anaesthesia group and had shorter intensive care and hospital stays. They determined that local anaesthesia could be used for selecting candidates and less complex procedures (4).

Previous studies suggest that priority should be given to techniques with the possibility of dose titration, such as CSA, rather than single-dose spinal anaesthesia, which can result in a high anaesthetic level, even with a low dose, especially for patients who are elderly or have cardiovascular and respiratory system problems (5, 6).

Similarly, there are some studies suggesting that CSA is superior to combined spinal-epidural anaesthesia (CSE) and continuous epidural anaesthesia (CEA) in terms of haemodynamic stability (7-9). Imbelloni et al. (10) suggested that both CSA and CSE provided good surgical conditions, and sensory blockade level and incidence of haemodynamic changes were lower with CSA in major orthopaedic surgery. Reisli et al. (11) reported that CSA had a more rapid onset of action, produced more effective sensory and motor blockade and a shorter recovery period and had fewer haemodynamic effects than CEA.

The studies evaluating levobupivacaine for CSA are limited in the present literature. In a recent study of Sell et al. (12), the minimum effective local anaesthetic dose was 11.7 mg for levobupivacaine using the CSA technique for hip replacement surgery. Baydilek et al. (13) reported that in patients undergoing TUR surgery with CSA, an average of 8.7 mg levobupivacaine provided sufficient anaesthesia. We obtained a sufficient anaesthetic level with 7.5 mg levobupivacaine in this case.

Mathes et al. (14) reported the use of CSA for the EVAR procedure in a patient with advanced respiratory problems. Following a starting CSA dose of 5 mg 0.5% isobaric bupiv-

acaine, within the first 20 minutes, they administered 2 extra 2.5 mg doses and obtained T10-level anaesthesia. During the operation, which lasted for 6 hours, they administered 2.5 mg in extra doses through the catheter twice. With minimal heart rate and blood pressure changes and without experiencing any respiratory problems, the procedure was completed. They reported that in patients with serious accompanying medical diseases, especially severe pulmonary problems, the CSA technique might be appropriate for the EVAR procedure.

The CSA method, which administers local anaesthetic media through a catheter located in the subarachnoid space, periodically and in lower doses, allows better control of the anaesthetic level and thus a reduction in the expected hemodynamic side effects. For this reason, it is suggested that the CSA method for patients with serious accompanying problems may be a better choice for establishing anaesthesia (15).

Conclusion

We believe the CSA technique may be safely used for the EVAR procedure in high-risk patients.

Informed Consent: Written informed consent was obtained from patient who participated in this study.

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