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Case Report Open Access

Our experience with carotid endarterectomy under cervical plexus block in a patient with an indication for heart transplantation

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ABSTRACT

Carotid endarterectomy is among the best treatment methods for patients with severe carotid stenosis who have experienced transient ischemic attacks. Performing it under cervical plexus block reduces anesthesia-related complications during the perioperative periods in patients for whom general anesthesia carries high risks. Additionally, it facilitates the early detection of intraoperative neurological complications. Herein, we shared our experience on a 56-year-old male patient who was at high risk for general anesthesia due to various comorbidities and underwent carotid endarterectomy under cervical plexus block. Cervical plexus block is a method that can be preferred in carotid endarterectomy due to reduced costs and the rapid detection of neurological complications during the operation.

Keywords: Carotid endarterectomy, cervical plexus block, local anesthetics.

Cerebrovascular diseases, along with malignancies and cardiac diseases, are among the leading causes of death. Carotid artery stenosis accounts for approximately 25% of all ischemic cerebrovascular events, and early diagnosis and treatment can reduce morbidity and mortality. Carotid endarterectomy (CEA) remains the gold-standard treatment method for symptomatic patients with severe carotid stenosis (>70% stenosis).[1]

Carotid endarterectomy surgery can be performed under general or regional anesthesia.[2] Regional anesthesia is becoming increasingly common in this surgery due to its ability to allow for consciousness, sensation, speech, and motor tracking during the intraoperative period, enabling early detection and intervention in cerebrovascular events that may occur within the case. Additionally, in elderly patients with low cardiac or pulmonary capacity, regional anesthesia is preferred for the higher risk of general anesthesia. Herein, we shared our experience of CEA surgery under deep-superficial cervical plexus block on a patient with an American Society of Anesthesiologists (ASA) physical status score of 4.[3]

CASE REPORT

A 56-year-old male with a known history of diabetes mellitus, hypertension, congestive heart failure, and coronary artery disease who had experienced an ischemic cerebrovascular event six years prior presented to the emergency department with complaints of slurred speech for the past two days and weakness in the right arm. Upon arrival, diffusion-weighted magnetic resonance imaging in the emergency department revealed diffusion restriction in the deep cortex of the left lateral ventricle, prompting investigation and treatment planning for cerebrovascular disease at the neurology ward. Upon physical examination on admission, the patient was conscious with dysarthric

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speech. Weakness was noted in the right upper extremity, with a first-degree paresis.

A craniocervical computed tomography angiography performed during hospitalization revealed mixed-type atheromatous plaques extending to the proximal segment of the internal carotid artery at both common carotid artery bifurcation levels, with a 90% stenosis observed in the proximal right internal carotid artery lumen.

The patient was evaluated for cardioembolic events, and the electrocardiogram (ECG) showed a first-degree atrioventricular block and an incomplete left bundle branch block. Echocardiography revealed an ejection fraction of 20%, global hypokinesis, and moderate mitral regurgitation, with a systolic pulmonary artery pressure of 35 mmHg. Under these conditions, the patient was evaluated as a heart transplantation candidate[4] but was not placed to the heart transplantation list due to carotid and peripheral artery diseases.

Diuretics were initiated for bilateral pleural effusions. The patient received a 3% sodium chloride infusion for hyponatremia (sodium: 117 mmol/L). Since an acute phase response was observed (C-reactive protein: 88 mg/L), the patient was assessed by infectious diseases for suspected infection, and piperacillin-tazobactam was initiated due to a suspected infective diabetic foot ulcer. The patient was scheduled for surgery and was evaluated preoperatively as ASA 4 due to additional comorbidities. A cervical plexus block was planned for the patient.

The patient's preoperative arterial blood pressure was 138/90 mmHg, heart rate was 87 bpm, and peripheral oxygen saturation (SpO_2) was 93%. Invasive blood pressure, oxygen saturation, temperature, ECG, patient state index (PSI), and near-infrared spectroscopy (NIRS) monitoring were conducted. Under sterile conditions, C2-C4 transverse processes were identified for the purpose of a right deep cervical plexus block. To each of the three points, local anesthetics were injected (2.5 mL of 0.5% bupivacaine and 1 mL of 2% lidocaine). Afterward, the superficial cervical plexus block was administered with 10 mL of local anesthetics. Adequate sensory block was confirmed in the planned surgical area, and the patient was handed over for surgery.

After the block, intravenous dexmedetomidine infusion (0.2 mcg/kg/h) was started for sedation. At the beginning of the surgery, NIRS readings were 34/36 (right/left). The patient lying supine was placed in a left hyperextension position, and the procedure commenced after surgical site preparation. Throughout the operation, consciousness was monitored, and motor functions were assessed.

Fifteen minutes after the start of surgery, 5000 IU of heparin was administered intravenously, and 3 min later, the activated clotting time was measured as 233. After 15 min of cross-clamp time, the right CEA (with the conventional technique) was completed, and after hemostasis, a drain was placed. The skin incisions were closed in accordance with the patient's anatomy. There were no changes in consciousness or motor function during the operation, and there was no drop in NIRS values. Sedation levels were adjusted according to PSI levels.

During the intraoperative period, there was no need for vasopressor agents, and there were no sudden bradycardia or hypotension events. At the end of the operation, NIRS readings were 45/35 (right/left). The patient was transferred to the intensive care unit (ICU) with an SpO_2 of 98% (under oxygen support), blood pressure of 148/88 mmHg, and a pulse rate of 81 bpm. The patient was monitored in the ICU overnight and transferred to the ward in the morning. The patient, who did not experience any complications, had the drain removed on the third postoperative day and was discharged.

DISCUSSION

While there are studies showing that there is no superiority among the anesthesia methods used for CEA,[5] the frequency of CEA performed under cervical plexus block is increasing nowadays due to its advantages such as allowing intraoperative consciousness monitoring, absence of recovery time in general anesthesia, increasing patient comfort, and reducing the hospital stay. The choice of anesthesia method can be determined by the clinic's experience, or in cases where general anesthesia is high risk, it can also be determined by considering the patient's benefit in reducing anesthesia-related complications.

Detecting immediate neurological signs during surgery performed with open consciousness and applying shunts to these patients can prevent unnecessary shunt use, thus reducing the frequency

of complications, such as stroke and vascular injury, that may arise from shunt application. In the GALA trial, a multicenter, controlled, randomized study, it was found that the use of regional anesthesia reduced the need for shunting from 43 to 14%.[5] However, in the same study, no significant difference was observed between regional anesthesia and general anesthesia in terms of perioperative death, stroke, or myocardial infarction. Nevertheless, there are studies indicating an increased risk of myocardial infarction in the general anesthesia group.[6] Neurological events occurred in 23 out of 310 patients, with a significant risk identified in those operated under general anesthesia.[7]

In this case, in addition to nerve block, sedation was provided to the patient with intravenous dexmedetomidine infusion to increase patient and surgeon comfort. As known, dexmedetomidine has anxiolytic, sedative, and analgesic effects, and its risk of respiratory depression is lower than other intravenous sedative agents. Dexmedetomidine improved the recovery of cognition after CEA, potentially due to reduced inflammation and enhanced brain-derived neurotrophic factor expression.[8] Due to the low hemodynamic effect of dexmedetomidine, there was no need for vasopressor agents at the sedation dose provided.

In conclusion, cervical plexus block for CEA is a method that can be preferred due to reduced costs and rapid detection of neurological complications that may occur during the intraoperative period. It significantly reduces the risk of intraoperative complications and ICU and hospital stays for patients. It is the preferred anesthesia method for patients at high risk for general anesthesia, provided there are no contraindications.

Patient Consent for Publication: A written informed consent was obtained from the patient.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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