Agri 2025;37(4):240–242
doi: 10.14744/agri.2023.93708

CASE SERIES

Efficacy of selective scalp nerve blocks for postoperative pain in craniotomy: A single-center experience

Ahmet Kürşat Kara,[1] Sinem Sarı,[2] Kadir Berkay Tan,[2] Abdullah Topçu,[1] Nilgün Dönmez,[2] Mehmet Turgut,[3] Osman Nuri Aydın[2]

[1]Department of Neurosurgery, Adnan Menderes University Faculty of Medicine, Aydın, Türkiye
[2]Department of Anesthesiology and Reanimation, Adnan Menderes University Faculty of Medicine, Aydın, Türkiye
[3]Department of Histology and Embryology, Adnan Menderes University Faculty of Medicine, Aydın, Türkiye

SUMMARY

Supratentorial craniotomy is frequently performed for intracranial pathologies. Two critical aspects of anesthetic management are maintaining hemodynamic stability and controlling postoperative pain. Hypnotic agents and opioids, although commonly used, increase the risk of complications. Scalp block is a simple, safe technique that reduces opioid use and stabilizes perioperative hemodynamics. At our center, four patients undergoing craniotomy for aneurysm or intracranial tumor received selective scalp blocks. Minimal opioids were required, no hypertensive or tachycardic responses were observed, and opioid-related side effects were avoided. Our findings support the complementary role of scalp block alongside routine anesthesia in craniotomy.

Keywords: Craniotomy; nerve block; postoperative pain; scalp block.

Introduction

Supratentorial craniotomy is a standard procedure in neurosurgery. Effective anesthetic management is essential to maintain hemodynamic stability. Scalp incision and muscle dissection, rather than brain manipulation, are the primary sources of pain.[1] Even under deep anesthesia, incision may trigger acute hypertension and increased intracranial pressure, potentially impairing cerebral perfusion. Postoperative pain occurs in up to 60–80% of patients and, if untreated, activates the sympathetic system, raising blood pressure and morbidity.[2,3]

Opioids remain central to pain control but are limited by side effects such as sedation, nausea, and delayed neurologic assessment.[4] Scalp block, first described in 1996, is an established, safe technique providing intraoperative stability and effective postoperative analgesia.[5,6] Here, we report our initial experience with selective scalp block in four patients.

Case Reports

Case 1 – A 41-year-old male with sphenoid wing meningioma underwent frontotemporal craniotomy. After general anesthesia induction, 3 mL of 0.25% bupivacaine was administered to the supraorbital, supratrochlear, and auriculotemporal nerves. The tumor was completely excised.

Case 2 – A 67-year-old male with a distal middle cerebral artery aneurysm underwent craniotomy with an incision extending frontally to the occipital region (Fig. 1). Blocks included the greater occipital (5 mL of 0.25% bupivacaine), lesser occipital (2 mL of 0.25% bupivacaine), auriculotemporal (3 mL of 0.25% bupivacaine), supratrochlear (3 mL of 0.25% bupivacaine), and supraorbital (3 mL of 0.25% bupivacaine) nerves. The aneurysm was clipped via Sylvian dissection.

Submitted: 06.06.2023 **Accepted:** 10.08.2023 **Available online:** 11.09.2025

Correspondence: Dr. Sinem Sarı. Adnan Menderes Üniversitesi Tıp Fakültesi, Anestezi ve Reanimasyon Kliniği, Aydın, Türkiye.
Phone: +90 - 256 - 218 20 00 **e-mail:** sarisinem@yahoo.com

Case 3 – A 74-year-old male with a pericallosal artery aneurysm underwent frontoparietal craniotomy. Each of the supraorbital, supratrochlear, and auriculotemporal nerves received 3 mL of 0.25% bupivacaine. The aneurysm was clipped using an interhemispheric approach.

Case 4 – A 69-year-old female with a middle cerebral artery aneurysm underwent frontotemporal craniotomy. The supraorbital, supratrochlear, and auriculotemporal nerves each received 3 mL of 0.25% bupivacaine. The aneurysm was clipped via Sylvian dissection.

Anesthesia Protocol

All four patients received standard induction (lidocaine 1 mg/kg, fentanyl 1 µg/kg, propofol 2 mg/kg, rocuronium 0.6 mg/kg). Arterial line and large-bore IV access were established. Monitoring included invasive and noninvasive blood pressure, oxygen saturation, ECG, and bladder catheterization. Selective scalp block was performed pre-incision with 0.25% bupivacaine, 2–5 mL per nerve, tailored to the incision site. To avoid intravascular injection, the superficial temporal and occipital arteries were identified, and ultrasound guidance was used.

Intraoperatively, remifentanil (0.05 µg/kg/min infusion) provided analgesia as needed. At closure, all patients received IV tramadol 1 mg/kg and paracetamol 1 g. Postoperatively, tramadol PCA was initiated (bolus 0.1 mg/kg, lockout 20 min, no basal infusion) for all patients. Paracetamol 1 g IV every 8 h was given routinely. Rescue analgesia was IM diclofenac 75 mg if NRS>4. Ondansetron 4 mg IV was administered for nausea or vomiting as required.

All blocks were completed successfully without complications. No patients developed hypertension or tachycardia during incision or craniotomy. Postoperative NRS scores were low and manageable with PCA. No additional opioid requirement, nausea, or respiratory depression was observed.

Discussion

Enhanced recovery after surgery emphasizes multimodal, opioid-sparing analgesia. Scalp block fits this approach by attenuating nociceptive surges during incision and stabilizing perioperative hemodynamics.[7–11]

Figure 1. A 67-year-old male patient operated for distal middle cerebra artery aneurysm and planned surgical incision.

Opioid-based anesthesia deepening increases postoperative morbidity and mortality, while selective scalp block reduces the need for opioids and their side effects. Compared with infiltration, scalp block offers superior pain control and intraoperative stability. Previous studies found no significant difference between bupivacaine and levobupivacaine,[12,13] supporting our choice of bupivacaine.

Our selective approach—blocking only nerves corresponding to the planned incision—may reduce complications and minimize the total anesthetic dose. Pre-incision administration is particularly advantageous in aneurysm and mass surgery, where hemodynamic surges can raise intracranial pressure or risk rupture.[14–16]

Although our series is limited to four cases, the findings align with existing evidence that scalp block is underutilized in neurosurgical anesthesia.[17]

Conclusion

Selective scalp block is a safe and practical adjunct to routine anesthesia for craniotomy. It supports intraoperative hemodynamic stability and provides effective perioperative analgesia while minimizing opioid exposure.

Ethics Committee Approval: This is case series, and therefore ethics committee approval was not required in accordance with institutional policies.

Informed Consent: Written informed consent was obtained from all individual patients included in this case series for publication of their clinical data.

Conflict of Interest: The authors declare that there is no conflict of interest.

Financial Disclosure: The authors declared that this study has received no financial support.

Use of AI for Writing Assistance: During the preparation of this work the authors used ChatGPT in order to improve language.

Authorship Contributions: Concept – SS, AKK, AT; Design – SS, AKK, MT; Supervision – SS, AKK, MT; Resources – AT, MT, ND; Materials – SS, AKK, AT; Data collection and/or processing – KBT, ONA, ND; Analysis and/or interpretation – SS, AKK, MT; Literature search – SS, AKK, ONA; Writing – SS, AKK, ONA; Critical review – MT, ND, KBT, AT, SS, AKK, ONA.

Peer-rewiew: Externally peer-reviewed.

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