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Scalp Nerve Block In Reconstructive Craniotomy: A Case Report

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ABSTRACT

Scalp block is an option in head surgery with certain procedures, namely when patient awareness is required, or techniques that require patient functional assessment and craniotomy. This block is performed on the supra orbital nerve, supra trochlea, zygomaticum temporal, auriculo temporal, auricular major, greater occipital and lesser occipital. We report a case of a 55-year-old man with Mild Traumatic Brain Injury GCS 14 + fracture of the Os Frontalis Sinistra, anterior wall of the Sinus Maxillaris dextra et sinisra and Os Zygomaticum sinistra, simultaneously for reconstructive craniotomy with scalp block anesthesia technique for post-surgical pain management. During the operation, hemodynamics were stable without complications. Post-surgery the patient was moved to the recovery room without complaints.

Keywords: Scalp Nerve Block, Reconstructive Craniotomy

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INTRODUCTION

The principle of "Scalp block" is to block the peripheral nerve fibers in the scalp; this technique was developed in the early 1900s by Harvey Cushing and George Crile.1 Blocking the surgical incision area on the scalp can be complemented by blocking the nerves that innervate the skin of that area. This block can be performed on the supraorbital, supratrochlear, zygomaticotemporal, auriculotemporal, greater auricular, greater occipital, and lesser occipital nerves. The development of this technique was limited by the availability of existing local anesthetic drugs. Existing local anesthetic cocaine is addictive, cardiotoxic, and neurotoxic, while procaine, a local anesthetic drug with a short duration of action, has a high frequency of allergies. [1,2] Scalp block was initially performed for intracranial surgical procedures without the need for general anesthesia. With the introduction of the endotracheal tube and the development of general anesthesia, the use of scalp block became less common. However, scalp block is still needed for head surgery with certain procedures, namely when patient awareness is required, or techniques that require patient functional assessment, craniotomy, deep brain stimulation, stereotactic procedures, as well as the treatment of chronic pain syndromes of the head and neck. [2]

CASE REPORT

A 55-year-old man presented to Ibnu Sina Hospital Makassar with complaints of wounds on the forehead, nose, and upper jaw after a head-on collision with another motorcyclist. Other complaints included headache, nausea, vomiting, and left shoulder pain accompanied by wounds on the leg area. There was a history of loss of consciousness for several minutes after the incident, and a history of hematemesis and epistaxis post-traffic accident. A history of food and drug allergies was denied by the patient. The patient had no prior history of anesthesia or surgery. On vital signs examination, the patient was in moderate illness, blood pressure was 138/79 mmHg, pulse 83 times/minute (within normal limits 60-100 times per minute), temperature 36.3 °C (within normal limits 36.1-37.2 °C), oxygen saturation or SpO2 99% (within normal limits >95%), and respiration 20 times per minute (within normal limits 16-20 times per minute). On

neurological examination, consciousness or GCS was 15 (E4M6V5), meaning the patient was compos mentis or fully conscious. On physical examination of the head, wounds were found in the frontal, nasal, and maxillary regions. Thorax, abdomen, and extremity examinations were within normal limits. Supporting examination with an MSCT Scan of the Head showed an impression of a fracture of the Os Frontalis Sinistra, the anterior wall of the Sinus Maxillaris dextra et sinistra, and the Os Zygomaticum sinistra with hematosinus and pneumocephalus accompanied by soft tissue swelling. Supporting laboratory examination of complete blood chemistry showed hemoglobin levels of 11.0 g/dL, leukocytes 14,200/uL, hematocrit 30.7%, and platelets 385,000/uL. Based on the results of the anamnesis, physical examination, and supporting examinations that had been performed, the patient was diagnosed with Mild Traumatic Brain Injury with a plan for Reconstructive Craniotomy. The chosen anesthetic technique was Scalp Block anesthesia.

The patient was positioned supine, an 18 G IV catheter was inserted in the left hand, and 0.9% NaCl solution was given for maintenance. Monitoring equipment for ECG, blood pressure, pulse rate, respiration, and oxygen saturation was attached. Premedication: Ondansetron 4 mg, Dexamethasone 10 mg, Paracetamol 1gr, Peinloss 400. The injection sites for local anesthetic drugs were as follows: supraorbital and supratrochlear nerve fibers; 1–2ml of local anesthetic solution was injected in the area above the eyebrow, auriculotemporal nerve fibers; 2ml of local anesthetic solution, greater occipital nerve fibers; 3-5 ml of local anesthetic solution was injected in the lateral third of the area of the imaginary superior nuchal line formed between the occipital protuberance towards the mastoid process. 5-7 The lateral third from the greater occipital nerve injection site is the injection site for the lesser occipital nerve. It is estimated that the injection sites of these nerves on the imaginary superior nuchal line are 4 and 7 cm from the occipital protuberance; the third occipital nerve is located 3 mm (average, 0–4 mm) lateral to the external occipital protuberance and communicates with the greater occipital nerve laterally. Maintenance: O2 3 lpm via nasal cannula. Anesthesia completed, adequate spontaneous breathing, stable hemodynamics. Patient transferred to PACU/recovery room. After the surgery was completed, the patient was taken to the monitoring room; after ensuring the patient had recovered from

anesthesia and that their general condition, consciousness, and vital signs were stable, the patient was transferred to the ward.

DISCUSSION

A meta-analysis study in 320 patients showed that the use of the scalp block technique blunts the hemodynamic response during head pin placement, reduces postoperative pain, and decreases opioid requirements, thereby facilitating postoperative neurological assessment. With the availability of long-acting local anesthetic drugs, and the evolution of the scalp block technique itself from initially blocking the surgical incision area of the scalp with local anesthetic infiltration to a more selective technique by blocking the nerve fibers innervating the incision area on the scalp, this has opened up wider opportunities for the use of this Scalp block technique. Scalp block can be performed for all supratentorial intracranial procedures, and can minimize the hemodynamic response to surgical stimuli, reduce intraoperative anesthetic drug requirements, decrease postoperative pain, and lower morphine analgesic consumption. Although it can provide effective anesthesia for skin incisions and craniotomy, it does not provide anesthesia to the dura mater. As in “Awake craniotomy,” with scalp block, the use of intravenous analgesia is still necessary for patient comfort, given by titration to allow functional assessment. Scalp block can also be used for other head surgeries in dermatological cases including keratosis, carcinoma, and also cranioplasty.[1-4]

An important aspect of scalp block is the blocking of the greater occipital nerve (GON) fibers. This technique has been used in headache clinics for several decades to manage patients with occipital neuralgia, migraines, cluster headaches, and post-concussion headaches. Like the GON, the third occipital nerve (TON) fibers can be a pain generator for cephalgia, especially after whiplash injury to the C2-3 zygapophyseal joints. The third occipital nerve has cutaneous fibers that innervate the lower part of the head.[2,4]

The success of this technique requires blocking several nerve fibers, performed on

one or more nerve fibers either for diagnostic purposes or for the treatment of chronic headaches. Scalp block can be performed unilaterally or bilaterally before head pin placement. Injection of local anesthetic in scalp block can be done at several points. An understanding of anatomy is necessary to achieve success with this technique. The highly vascular nature of the scalp, the use of large volumes, or the presence of skull bone abnormalities require special attention; systemic toxicity, cardiotoxicity, or neurotoxicity from local anesthetic administration, especially drugs with slow onset, must be considered. For blocks in the supraorbital area and part of the frontal region, injections can be given to the supratrochlear and supraorbital nerves. Local anesthetic injection for the supratrochlear nerve is performed 1.6 cm lateral to the midline, 0.7 cm from the inferior edge of the superior orbital rim or eyebrow, with a volume of 1–2 ml of local anesthetic for each supratrochlear nerve. Local anesthetic injection for the supraorbital nerve is performed 1 cm lateral to the supratrochlear nerve with 1–2 ml of local anesthetic for each supraorbital nerve using a 23 or 25-gauge needle injected perpendicular to the eyebrow skin.[5,7]

For the area between the frontal and temporal regions, injections can be made in the area of the zygomaticotemporal nerve, which is the V2 division of the 5th cranial nerve (trigeminal nerve). Local anesthetic injection is performed 1 cm posterolateral to the canthus with a volume of 2–3 ml. 7 Anesthesia of the temporal region can be achieved by injecting local anesthetic in the area of the auriculotemporal nerve fibers, which is the V3 division of the 5th cranial nerve (trigeminal nerve). The injection site is 1.5 cm anterior to the tragus. Some techniques suggest injection down to the deep fascia, but a superficial injection is adequate to achieve the block, so injection to the deep fascia is not necessary due to the risk of facial nerve block. For the occipital area and part of the posterior temporal region, local anesthetic can be injected at the lesser occipital nerve, greater occipital nerve (GON), and third occipital nerve (TON), which are branches of Cervical 2 and Cervical 3. [5-7]

CONCLUSION

The use of scalp block for intracranial surgery shows highly effective results, with a simple and safe technique for neuronal blockade. Anatomical understanding of the innervation of the surgical incision area on the scalp is crucial in achieving the success of this technique. Scalp block is indicated to blunt the hemodynamic effects of the surgical response and to reduce acute or chronic pain in intracranial-extracranial surgery; for this, a combination of techniques, patient understanding, and the latest technical developments are necessary. However, the use of extracranial blocks, including scalp block, to eliminate pain from the dura mater is not optimal and represents a limitation of this technique in managing postoperative pain. Thus, for procedures that cause traction, manipulation, and inflammation of the dura mater, the effectiveness of scalp block will greatly depend on the addition of other analgesics.

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