Transient facial nerve palsy after scalp block for awake craniotomy: A case report

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ABSTRACT

Awake craniotomy is a unique clinical setting that needs anesthesiologist to provide variable states of sedation and analgesia to ensure optimal operating conditions without compromising patient safety. Scalp block is an integral part of awake craniotomy as it provides regional anesthesia to the nerves innervating the scalp. It minimizes response to noxious stimuli of cranial pin application and craniotomy. We report a case of transient facial nerve palsy after scalp block in awake craniotomy in a patient with a lesion in the motor cortex. Facial nerve palsy has been described as a rare complication of scalp block and is less reported.

Keywords: *Auriculotemporal nerve, Awake craniotomy, Facial nerve palsy, Local anesthesia, Motor cortex, Scalp block*

The brain is a functionally active and complex structure. Eloquent areas of the brain are responsible for sensory, motor, vision, speech, and language functions. Advances in neuroimaging have helped the neurosurgeons to precisely delineate these areas and their relation with the space-occupying lesions while their excision may potentially result in permanent deficits unless the functional areas are continuously mapped and tested intraoperatively. Objective mapping and localization of eloquent areas are possible under general anesthesia, but for subjective testing, the patient needs to be motivated, awake, comfortable, cooperative, and free of pain.

Awake craniotomy has a distinct advantage for both mapping and subjective testing with real-time feedback of neurological status. Scalp block provides regional anesthesia to the nerves innervating the scalp, minimizing the response to noxious stimuli of cranial pin application, and craniotomy [1-3]. Anesthesiologists need to be aware of the complications of this procedure. Our case report describes transient facial nerve palsy, a rare but important complication of scalp block.

CASE REPORT

A 38-year-old male, American Society of Anesthesiologists (ASA) grade i underwent awake craniotomy for excision of glioma involving the left motor cortex. Pre-operative counseling of the patient was done regarding the advantages of awake craniotomy and scalp block. Written informed consent for surgery was obtained.

Pre-operative fasting guidelines were followed and routine medications including antiepileptics (Inj. Levetiracetam 500 mg intravenous [IV]) and steroids (Inj. Dexamethasone 4 mg IV) were administered in the morning of the surgery and repeated after 8 h. In the operation theater, the patient's details were confirmed, ASA standard monitors such as electrocardiogram, non-invasive blood pressure, pulse oximetry were attached and two large-bore IV accesses were secured. Emergency airway devices were kept ready for any potential airway complications. Supplemental oxygen was provided with face mask and end-tidal CO_2 was monitored. The patient received IV midazolam 2 mg, fentanyl 100 mcg, glycopyrrolate 0.2 mg, and paracetamol 1 g. Bolus doses of midazolam and propofol, as well as cold saline irrigation, were kept ready in the unlikely event of intraoperative seizures. Scalp block was performed by injecting 2–3 ml of 0.5% bupivacaine at each nerve site as described by Pinosky *et al.* [1]. The left radial artery was cannulated under local anesthesia for invasive blood pressure monitoring.

The patient complained of inability to close his right eye 10–15 min after scalp block (Fig. 1). In addition, we observed deviation of angle of mouth to the right and Grade IV right facial nerve palsy on the House–Brackmann scale was diagnosed (Fig. 2). The patient was informed of this rare complication and was assured of its recovery. The neurosurgical team was informed to avoid potential intraoperative neuromonitoring errors. The patient was cooperative for motor testing throughout the intraoperative period and maximum safe resection of the lesion was carried out uneventfully. Once resection was deemed to be complete, the patient was sedated until the end of the surgery. Scheduled doses of antiepileptics and steroids were administered intraoperatively. Postoperatively, the patient was shifted to

an intensive care unit for monitoring. The patient completely recovered from facial nerve palsy symptoms after 4–6 h (Fig. 3).

DISCUSSION

Neurosurgery under local anesthesia is performed either for resection of lesions in eloquent cortex or to treat disordered behavior or function [4]. Minimal effects of anesthetics would enable better electrocorticography, cortical mapping, and safer excision of the lesions near eloquent cortex [5,6]. Awake craniotomy for intraoperative brain mapping allows for safe resection and improved outcome while providing an insight into functional neuroanatomy [7]. The patient participation and motivation are important for the overall success of this procedure. The goal of the anesthesiologist is to provide patient comfort, cooperation, excellent surgical conditions, and minimum hemodynamic changes throughout the procedure.

The scalp is innervated by the supraorbital and supratrochlear branches of the ophthalmic division of trigeminal cranial nerve; a zygomaticotemporal branch of the maxillary division of trigeminal cranial nerve; an auriculotemporal branch of mandibular division of trigeminal cranial nerve; and greater and lesser occipital nerves. The greater occipital nerve is a branch of the C2 dorsal ramus and lesser occipital nerve also known as the small occipital nerve arises from ventral ramus of C2 although it often receives fibers from C3 as well. The scalp block involves anesthetizing all these nerves with local anesthetics and provides pain relief to both the superficial and deep layers of the scalp [1,3].

Figure 1: Inability to close the right eye

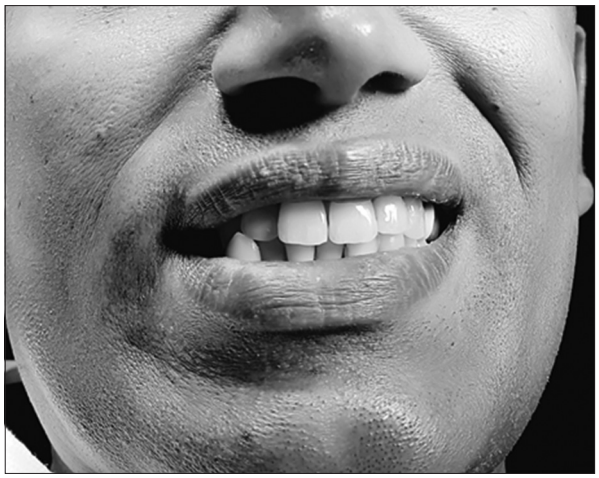

Figure 2: Deviated angle of the mouth

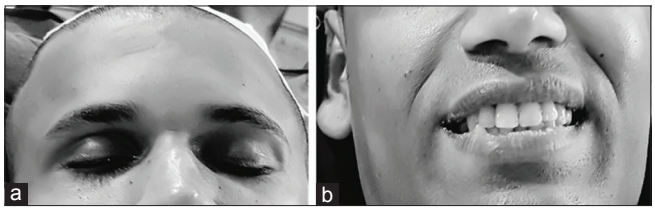

Figure 3: Recovery of the patient (a) patient able to close the right eye; (b) absence of deviation of angle of the mouth

Scalp block has potential complications such as local anesthetic toxicity, accidental intra-arterial injection, and inadvertent subarachnoid injection. Osborn and Sebeo had mentioned facial nerve palsy as a possible complication of scalp block [3].

In this case report, we report transient facial nerve palsy, a rare complication of scalp block. On a detailed literature search, only one case series of facial nerve palsy has been reported in awake craniotomy after scalp block [8]. Harbers *et al.* have reported facial palsy following scalp block for post-craniotomy pain relief in a patient under general anesthesia [9]. Transient facial nerve palsy has also been reported following occipital nerve block [10].

The location of the facial nerve may be one of the causes for this complication. The facial nerve exits the facial canal through the stylomastoid foramen, closely located to auriculotemporal nerve just anterior to the tragus. Downward direction of the needle or relatively large volume of local anesthetic while blocking the auriculotemporal nerve may result in a spread of the local anesthetic to the adjacent facial nerve and its palsy. This technique needs to be modified as explained by Bebawy *et al.*, in which they described auriculotemporal nerve block by injecting 3 ml of local anesthetic instead of 5 ml and injecting it posterior to superficial temporal artery 1 cm cephalad to the tragus. It was observed that the complication rate significantly decreased using a modified block technique [11]. Strauss *et al*. reported transient facial nerve palsy lasting 4–5 h after administering the occipital nerve block to relieve a headache in the occipital, parietal, and temporal region. They postulated an aberrant course of the facial nerve, prone position of the patient during the procedure, and large volume of local anesthetic used to be the causes of facial palsy [10]. As our patient was positioned supine after the scalp block, facial palsy following occipital nerve block seems unlikely.

Direct trauma to the facial nerve by needle could also result in palsy. This would be for a longer duration or there may be permanent residual damage. Besides such trauma, facial nerve could be injured by wrongly placed surgical pins, hematoma, or high volume of local anesthetic infiltrated causing pressure on the facial nerve.

In our institute, this was the first case of facial nerve palsy following administration of scalp block. The authors administer scalp block for awake craniotomy, deep brain stimulation for Parkinson's disease and to relieve intraoperative, as well as post-operative pain in selected cases. In our case, the facial nerve palsy lasted for 4–6 h, which coincided with duration of scalp block. This suggests facial palsy occurred either due to the placement of the needle in close proximity to the facial nerve or spread of the anesthetic to the facial nerve while blocking auriculotemporal nerve.

CONCLUSION

Facial nerve palsy after scalp block is a rare but distressing complication, resulting in potential intraoperative neuromonitoring errors if not detected early. Knowledge of the facial nerve anatomy and modifications in scalp block technique will help in the prevention of this complication. Careful injection of local anesthetic in an adequate volume prevents direct pressure on the nerve and its accidental block. Early diagnosis and counseling of the patient help to reduce patient anxiety and ensure cooperation.

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