DOI: https://doi.org/10.53350/pjmhs22167532

ORIGINAL ARTICLE

Assessment of Postoperative Neurosensory Deficit Following Craniomaxillofacial Reconstruction Utilizing Bicoronal Flap

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ABSTRACT

Objective: To assess post operative neurosensory deficit following craniomaxillofacial reconstruction using bicoronal flap.

Subject and Methods: In altogether, 44 individuals between the ages of 18 and 60 were included in the research. All patients reported with primary complain of craniomaxillofacial trauma. Bicoronal flap was utilized in all patients. All patients were clinically examined for neurosensory deficits (supraorbital , supratrochlear region , zygomaticotempral and auriculotempral nerve). At least three intervals of one month, three months, and six months have been used to follow up on every case.

Results: In 1st month evaluation, 14 patients were seen with neurosensory deficit with supraorbital nerve and 2 patients with supratrochlear nerve, while none of the patients were seen with disturbances in auriculotemporal and zygomaticotemporal nerve. At 6 month interval only 3 patients were remained with paresthesia of supraorbital nerve

Conclusion: Using a bicoronal flap during craniomaxillofacial surgery is recommended, it provides excellent access and has reduced complications

Keywords: Bicoronal Flap, Craniomaxillofacial Reconstruction, Neurosensory Deficit

INTRODUCTION

Trauma to the maxillofacial region is a crucial area of research in plastic and reconstructive surgery. The robust internal fixation and surgical techniques that allow for extensive exposure of the injured region represent the most important recent improvement in the treatment of facial injuries.[1]

Craniofacial surgeons have included coronal scalp incisions to their toolbox of surgical methods for reaching and managing upper mid face traumas. Coronal scalp incisions have been routinely utilised by neurosurgeons for different intracranial and extracranial accessibility.[2] The visual benefit of a hairline scarring explains why it has remained prominent. The frontal bone, nasal bone, and severe fractures affecting the zygomatic arch and complex may all be treated with it in maxillofacial surgery.[3]

The best surgical strategy for treating the craniomaxillofacial skeleton should permit for excellent aesthetic outcomes, maximal accessibility of the facial skeleton, and little risk of harm to the facial architecture.[4,5] Hemicoronal, preauricular, infraorbital, lateral eyebrow, and bicoronal approaches are only a few of the layouts that have been discussed.[6]

The upper and middle third of the face may be surgically exposed while causing the least amount of damage attributable to the bicoronal technique, which is considered to be both trendy and adaptable.[7,8] Its significance may be attributed to the good accessibility and aesthetically pleasing scarring that this method provides. One of the adaptable techniques for the skull and frontal area is the bicoronal technique made known by Tessier.[9]

The amount to which important face features are exposed, aesthetics, and possible morbidity all affect the surgical access to this area. The best surgical strategy should allow for enough exposures, lower the chance of damaging crucial tissues, and permit satisfactory attractive results.[10]

Bicoronal flap, meanwhile, has the possibility to harm the temporal branch of the facial nerve, which might lead in sensory disruption, anesthesia, or paresthesia involving the supratrochlear nerve, supraorbital nerve, and preauricular area, as well as paralysis of the frontalis muscle.[11]

This study's objective is to quantify the incidence of postoperative neurosensory abnormalities after bicoronal flap craniomaxillofacial reconstruction.

MATERIAL AND METHODS

From January 2019 to December 2021, this evaluation was conducted at the Lady Reading Hospital, Medical Teaching Institution, Peshawar KPK, oral and maxillofacial surgery unit in partnership with the neurosurgery department. The research included a total of 44 victims with craniomaxillofacial trauma.

Inclusioncriteria:

- Individuals with a record of craniomaxillofacial trauma between the ages of 18 and 60
- Either gender
- Medically fit patients for general anesthesia

Inclusion Criteria:

- Refusing to take part in the research
- Infected fractures
- Patients with previous history of craniomaxillofacial trauma
- Medically compromised patients

Data Collection Procedure: The study was carried out after the permission of institutional ethical board. All patients were managed under general anesthesia by single maxillofacial and neurosurgeon. Pre operatively patients were diagnosed for craniomaxillofacial trauma clinically and radiographically. For a conclusive confirmation, a computed tomography (CT) scan of the brain and face (axial and coronal section) with 3D reconstruction was ordered. For accessibility to the craniofacial fractured area, all individuals had surgery using the bicoronal surgical incision [Figure 1], and in a select few instances, further incisions such the infraorbital and intraoral degloving incisions were also performed to completely expose the midface.

To aid dissection and reduce blood loss, a topical anaesthetic containing adrenaline was infused along the intended Lazy S incision line. The pre-auricular incision was identified by an incision 2 to 3 cm posterior to the hairline. To stop bleeding, the scalp was clamped using Allis forceps. The periosteum was unaffected by the incision, which was made superior to the loose areolar plane and parallel to the skin's hair follicles into the galea. The flap was progressively moved ahead until it was 5 cm above the supra-orbital ridges during the supra-periosteal dissecting. The temporalis fascia is then covered by an incision in the periosteum of the skull. After that, the detachment is superficial to the temporalis muscle and sub-periosteal on the skull and beneath the temporalis fascia on the temporal zone. The area right beneath and along the temporalis fascia's connection to the superficial

temporal line must be cut. From this point on, the major flap also includes the periosteum and the temporalis fascia. This action is essential for avoiding facial nerve palsy. The supra-orbital neurovascular bundle was later located and liberated from its foramen by cutting a tiny wedge of bone above. This flap is now expanded downward. This makes the flap easier to retract deeper and lessens forehead paresthesia. The flap was then dissected inferomedially to disclose the whole nasal, ethmoidal, and orbital areas once the neurovascular bundles had been fully released. A sub-periosteal incision is created incorporating the superficial portion of the temporalis fascia attachment to the zygomatic arch when the superior boundary of the arch is felt laterally. This exposes the arch and reflects the whole flap inferiorly. In the event of frontal sinus obliteration, dural repair, and anterior cranial fossa base fracture in conjunction with face fractures. After the pieces have been reduced, fixed with titanium micro plates and mesh, or a craniomaxillofacial abnormality has been corrected The scalp was then sealed in layers with 3-0 polyglactin and 2-0 nylon after a drain was set up to avoid hematoma. For 72 hours, the pressure bandage was kept in place.

The drain was then withdrawn, and the subjects had a clinical examination for neurosensory impairments on the fifth post-operative day (supraorbital , supratrochlear region , zygomaticotempral and auriculotempral nerve).Neurosensory dysfunctions were assessed using the two point discrimination, pin prick test, thermal discrimination and brush directional strokes. In intervals of one month, three months, and six months, all patients have been tracked up for a minimum of six months.

Figure 1: Showing Steps of Bicoronal Flap Craniomaxillofacial Trauma

RESULTS

A total of 44 patients of craniomaxillofacial trauma participated in the study. Out of 44, there were 36 male patients and 8 female patients, as shown in figure 2.

Postoperatively patients were evaluated for supratrochlear, supraorbital, auriculotemporal and zygomaticotemporal nerve paresthesia. In 6 months follow up period, injury to supraorbital nerve was seen in most of the patients, no patient was reported with auriculotemporal and zygomaticotemporal nerve deficit. Detailed findings are mentioned in table 1.

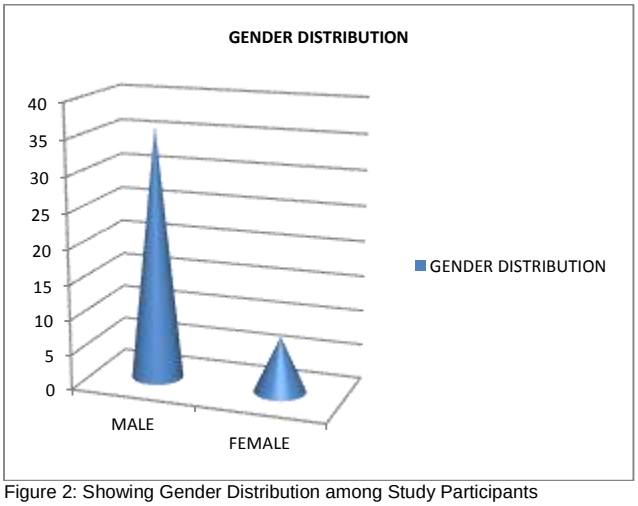

Figure 2: Showing Gender Distribution among Study Participants

Table 1: Showing Postoperative Neurosensory Deficits

Postoperative Neurosensory Deficit	1 Month Follow Up	3 Month Follow Up	6 Month Follow Up
Supraorbital Nerve	14 (31.81%)	12 (27.27%)	03 (6.81%)
Supratrochlear Nerve	02 (4.54%)	00 (0%)	00 (0%)
Auriculotemporal Nerve	00 (0%)	00 (0%)	00 (0%)
Zygomaticotemporal Nerve	00 (0%)	00 (0%)	00 (0%)

DISCUSSION

The best surgical strategy for treating the craniomaxillofacial skeleton should allow for excellent aesthetic outcomes, maximal accessibility of the facial skeleton, and minimal risk of harm to facial tissues.

In individuals with complicated facial fractures and those who have fractures in the top and middle thirds of the face (particularly frontal bone/sinus, orbital roof, and zygomatic arch fractures), a coronal incision is recommended. A bone graft may be used to fill deformities to endorse facial soft tissues, reestablish the bony buttress, and maintain facial height

The craniomaxillofacial region may be approached in a variety of ways, with the coronal incision offering the best visibility and flexibility. The visual benefit of a hairline scar explains why it has remained prominent.[13]

The supraorbital and preauricular sensory abnormalities that cause forehead and temporal paresthesia/anesthesia, motor impairment of the zygomatic and temporal branches of the facial nerve, and seroma or hematoma under the flap are all consequences of the bicoronal technique.[4]

Our study comprises of 44 patients, who underwent bicoronal flap reflection due to craniomaxillofacial trauma. Postoperatively patients were evaluated for supratrochlear, supraorbital, auriculotemporal and zygomaticotemporal nerve paresthesia for upto 6 months. In 1st month evaluation, 14 patients were seen with neurosensory deficit with supraorbital nerve and 2 patients with supratrochlear nerve, while none of the patients were seen with disturbances in auriculotemporal and zygomaticotemporal nerve. At 6 month interval only 3 patients were remained with paresthesia of supraorbital nerve, while patients who earlier had paresthesia of supratrochlear were having normal sensation at 6 month follow up.

Mahipathy[13] conducted operations on five individuals with complicated cranio-maxillofacial injuries using a bicoronal flap that included the frontal bone, zygomatic arch and zygomatic complex, nasal bone, and supra-orbital area. This was done as part of a clinical and observation research. According to his research 's findings, 2 out of 5 patients had sensory nerve impairments in the supraorbital and supratrochlear area after surgery, although these symptoms resolved within two weeks. These findings were quite related to our study results.

Forty patients with craniomaxillofacial injuries who needed bicoronal flap surgery or fracture fixation were periodically monitored by Sikkerimath BC.[6] In his research, 11 patients (27.5%) experienced supraorbital surgical paresthesia; 9 of these patients (22.5%), their sensibility returned to normal within six months; and 2 patients (5%), their sense returned to normal after a year. None of the patients had paresthesia or anaesthesia of the supratrochlear, zygomaticotemporal, or auriculotemporal nerves.

Corresponding to this, four patients in Rajmohan et al[3] research had sensory nerve impairments throughout the supraorbital nerve's distribution, which vanished entirely after six months. Similar findings were observed by Singh and Dhungel in their research, which found that no neurosensory problems persisted after 6 months in 28.6% of patients with neurosensory impairments.[2]

CONCLUSION

An effective surgical procedure, the bicoronal flap offers great accessibility and has few problems. Supraorbital nerve is mostly involved with neurosensory deficit using this technique. To avoid damaging the nerve and the emergence of postoperative neurosensory impairments, surgical competence is required.

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