RESEARCH ARTICLE

MANAGEMENT OF UPPER AND MIDDLE THIRD OF THE FACE FRACTURES THROUGH BICORONAL ACCESS

Abdul Azam Khan[1], GU Maheswari[2], S Gandhiraj[3]
1. Professor & Head, Dept of Oral & Maxillofacial Surgery, Dental College Azamgarh, UP
2. Professor, Dept of Oral & Maxillofacial Surgery, GDC, Chennai
3. Professor, Dept of Oral & Maxillofacial Surgery, GDC, Chennai

ABSTRACT

Introduction: The bicoronal flap (bifrontal, bitemporal) has been used by the neurosurgeons to gain access to the anterior cranium for nearly a century. It is nowadays used for variety of surgical procedures like gaining access to severe craniofacial disjunction injuries including lefort type III, frontal sinus and nasoethmoidal fractures and zygomatic complex fractures, simultaneous craniotomy procedures for intracranial injuries, and treatment of facial fractures, access osteotomies for orthognathic procedures, correction of craniofacial deformities and harvesting of calvaria grafts etc

Material and Method: A group of six patients were selected, all were male with age ranging from 21 to 48 years. All patients suffered fractures of upper and middle third face fractures along with bony injuries of lower third of face in some patients.

Result: The observation and results reveal that bicoronal approach has been found very useful and versatile surgical approach in the management of comminuted and/or displaced fractures of upper and middle third of the face.

Conclusion: With an adequate knowledge of surgical anatomy and some modifications with the incision, facilitates the procedure with minimal or no significant complications.

Keywords: Bicoronal approach, upper and middle third of the fracture.

INTRODUCTION:

For many years multiple facial fractures have been treated through a variety of small incisions placed strategically about the face and these small wounds create multiple scars which is aggravated when these peepholes are stretched by retractors and rubbed by mechanical tools.

The bicoronal flap (bifrontal, bitemporal) has been used by the neurosurgeons to gain access to the anterior cranium for nearly a century. It was first described by HARTLEY and KENYON in 1907 and two decades later was advocated by SACHS for bilateral frontal lobe exposure. However, it did not gain widespread acceptance in maxillofacial surgery until the 1970's when TESSIER and later ANDERSON and JACKSON reported excellent access that it provided for lefort II and lefort III osteotomies.[1]

With the evolving concepts of craniomaxillofacial fracture management the basic five principles governing current

Corresponding Author: Dr Abdul Azam Khan Email: doc_azam@yahoo.co.in

management are, precise anatomic diagnosis, direct fracture exposure, reduction and rigid internal fixation, primary bone grafting and periosteal and soft tissue suspension and repair. Early intervention should be done to prevent secondary deformities associated with such injuries.[2]

Bicoronal approach is nowadays used for variety of surgical procedures like gaining access to severe craniofacial disjunction injuries including lefort type III, frontal sinus and nasoethmoidal fractures and zygomatic complex fractures, simultaneous craniotomy procedures for intracranial injuries, and treatment of facial fractures, access osteotomies for orthognathic procedures, correction of craniofacial deformities and harvesting of calvaria grafts etc.[3]

The coronal incision offers advantages like an excellent and extensive approach to the frontal, nasal, superior and lateral orbit and zygomatic complex and zygomatic arch fractures which no other single approach can provide which aids in ensuring exact anatomical reduction of the fracture and also a well-hidden scar within the hairline and achieves overall superior functional and aesthetic results. [3,4,5,6,7]

MATERIAL AND METHOD:

"Management of upper and middle third of the face fractures through bicoronal access" was done in the Department of Oral & Maxillofacial Surgery, Tamil Nadu Government Dental College & Hospital, Chennai. A group of six patients were selected, all were male with age ranging from 21 to 48 years. All patients suffered fractures of upper and middle third face fractures along with bony injuries of lower third of face in some patients.

Types of fractures include bilateral lefort III, comminuted zygomatic complex fractures, nasal bone and frontal bone fractures. Most of the patients have multiple and/or comminuted fractures.

Complete case history of the patient was recorded which includes chief complaint, history of present illness, past medical and surgical history, personal history and drug allergies. Clinical and radiographic examination was performed for final diagnosis of fractures. Preoperative clinical examination includes inspection of facial asymmetry and injuries like lacerations, abrasion, hematoma, circumorbital edema and ecchymosis, subconjunctival hemorrhage, midface depression, traumatic telecanthus, ocular dystopia, nerve paresthesia, mouth opening, and occlusion. Palpation for bony mobility and step deformities at fracture sites were performed.

All the patients underwent radiological examination using occipito mental view and lateral cephalogram and submentovertex if required. CT scans with axial, coronal and 3D reconstruction were also taken for all cases.

All cases were treated by open reduction and internal fixation under general anesthesia using bicoronal incision. Vestibular and other incisions were also used wherever required for management of other lower face fractures. 2-hole,4-hole,6 hole or sometimes continuous holes stainless steel plates were used which were plates with bar, Y-shaped, L-shaped or other shapes for internal fixation of fractures were also used depending on the anatomical site. Trans osseous wires were also used wherever required. The dimensions of plates used were 1.5 mm or 2 mm in diameter. The stainless-steel screws used for fixation were 1.5x4 mm, 1.5x6mm, 2x4mm, 2x6mm, 2x8mm in dimensions. Post-operative clinical evaluation was performed for assessment of reduction, aesthetics, function and complication.

SURGICAL PROCEDURE

All the cases were operated under general anaesthesia. All the patients underwent full head and facial shave before surgery. Nasoendotracheal or orotracheal intubation was used for all patients depending upon the involvement of bones in the fracture site. It was inserted either by blind nasal or oral route or fibreoptic technique depending on the difficulty during intubation. Once the patient is intubated scrubbing with betadine from the scalp to neck region was done bilaterally and draped to expose only the site of operation.

Incisions were located to be placed along a line extending from one preauricular area to the other curving slightly anteriorly at the vertex usually paralleling but remaining 4 to 5cm within the hairline. **Figure 1** Munro Ian R, Chir B: The coronal incision revisited. Journal of plastic and reconstructive surgery 93(1):185-7, Jan 1994.Vasoconstrictor with saline is injected into the subgaleal plane.

Initial standard bicoronal incision was made with no.10 blade extending from one superior temporal line to other extending deep till the galea revealing subgaleal plane which is rapidly lifted and elevated. **Figure 2** Incision below the temporal line extends till glistening superficial temporalis fascia. Preauricular extension of the incision made till the level of lobule. Bleeding vessels isolated and cauterized. Flap elevated with finger dissection, dissecting the portion of flap below superior temporal line above the temporalis fascia allows flap to retract anteriorly 3-4 cm superior to supraorbital

rims. Periosteum is incised about 3 cm above the supraorbital rims or according to the involvement of frontal bone posteriorly from one superior temporal line to another. Subperiosteal dissection now exposes the fracture sites of frontal bone till the supraorbital rims. Lateral portion of the flap elevated within 2-4 cm of body of zygoma and inferiorly to the root of zygomatic arch and palpated. Superficial layer of temporalis fascia is incised at the root of arch and incision continued anteriorly and superiorly at 45 degree angle joining the pericranial incision at superior temporal line, **Figure 3** Temporal pad of fat was left undisturbed and dissection continues inferiorly in same plane with metzenbaum scissors. Temporal branch of facial nerve was always lateral to temporalis fascia. Periosteal incision can now be given over the superior surface of the arch and continued superiorly along the posterior border of body of zygoma and orbital rim meeting crosshead incision and subperiosteal elevation done along with the flap to expose zygomatic arch, body of zygoma and lateral orbital rim.

To expose superior orbit / nasal bone the supraorbital neurovascular bundle was released. Dissecting subperiosteally over the superior and medial orbital rims allows retraction down to the level of nasal bones and lateral nasal cartilage. Lateral rim dissection was done when required. Vertical releasing incision over the periosteum of the bridge of the nose was given when required. After this dissection, most of the fracture sites were exposed.

Reduction of fractures was done according to fracture site and near anatomical reduction was achieved even in grossly displaced fractures. Fixation of fractures was done with stainless steel miniplates and screws of varying sizes and shapes as per the requirement, **Figure 4** Hemostasis was achieved and betadine saline irrigation was done.

Scalp incision is closed in 2 layers using slowly resorbable 2-0 vicryl through the galea/subcutaneous tissues and 3-0 ethilon sutures for skin. Elastoplast pressure bandage was placed.

FOLLOW UP

The follow up period ranges from 3-6 months with review on 15th day, 1 months, 3 months and 6 months postoperatively Pre and post-operative photographs, frontal and lateral view were taken for comparison on clinical grounds.

Occipitomental skull radiographs were obtained 1 month post op for assessment of fracture reduction and stability. Neurosensory deficits were examined using clinical examination (cold, light touch and

two-point discrimination). Other complications were observed clinically.

RESULT:

Statically satisfying results were achieved in all the patients except one in whom telecanthus and nasal deformity could not be primarily corrected. None of the patients were troubled by visible preauricular scars which were almost inconspicuous. No hypertrophic scar was seen in any of the patients.

No case of postoperative hemorrhage or hematoma was encountered. None of the patients in our study encountered any form of infection at the incision site or at the fracture fixation site. No stitch abscess was encountered.

Swelling at the supraorbital region developed in one case 15 days postoperatively which resolved following antibiotic therapy

Mild weakness of the temporal branch of facial nerve was seen in 2 cases with difficulty in forehead wrinkle formation and eyebrow elevation which was transient and completely resolved in 2 months following physiotherapy. No permanent motor deficit was seen in either of cases.

Unilateral Supraorbital transient sensory loss was seen in one patient which also recovered in 3 months.

Transient neurosensory deficits related to zygomaticofacial and auriculotemporal nerves though less avoidable, was less troublesome to the patients.

DISCUSSION:

The ideal surgical approach to treat craniomaxillofacial fractures should provide maximum exposure of the fractured segments, ensure less potential for injury to facial structures and allow for good cosmetic results. Several approaches have been described.

In formulating a treatment plan, selection of surgical approach is important because it could influence the ease of reduction and fixation of the fractured segments, the length of the operating time and length of the hospital stay.

Several discussions have been taken about the excellency in coronal approach, on the other one complication also give a problem surgeon face difficulty. So firstly, I discuss about complication.

Complications are divided into early and late complications[3]. Early complication which includes hemorrhage and hematoma under the flap, infection, swelling, transient sensory disturbances of supraorbital and preauricular areas, temporary nerve injury Now late complication is Alopecia at the incision site, permanent sensory loss at

incision line, Permanent deficit of frontal branch of facial nerve leading to inability to form forehead wrinkles and eyebrow elevation on the affected side and eyelid closure, temporal hollowing, widened scar.

Hematoma and infection have also been reported in the literature [3,8,1,9] but in our cases none of the patients reported such complication. Suction drains and pressure dressings for 48 hours were applied in various studies44.and so for all cases in our study. With meticulous surgical technique and the use of high dose, short course prophylactic antibiotics and suction drainage, such complications can be reduced. Shepherd DF et al in 1985[9] and Abubaker et al in 1990[3] have reported very few cases of hematoma as complication.

Frodel et al in 1993[11] reported facial nerve weakness in 41.7% of his patients treated with coronal approach but resolved in one month except 2 patients in whom permanent facial weakness was seen. In our study 2 cases showed mild weakness of the frontal branch of facial nerve with inability to form wrinkles and elevate the eyebrow most probably due to retraction or less probably due to direct nerve damage which resolved within 2 months. A dual plane approach is described by Srinivasan et al in 2010 for avoiding damage to temporal branch of facial nerve [10]

When performing a procedure with cosmetic concerns, the final appearance of the scar is of paramount importance. Zhang et al (2006)[6] few cases suffered scar wider than 0.5 cm. In study by Abubaker in (1990)[3] one case out of 28 suffered a scar of 3 cm. In our study none of the patients had a scar greater than 0.5 cm at 3 months.

Alopecia at the incision site is sometimes associated with coronal incision due to direct injury to the hair follicles. Various modifications of the techniques are offered to prevent this complication[6,12]

CONCLUSION:

- Coronal incision aids in ensuring exact anatomical reduction of the fracture and also a well-hidden scar within the hairline and achieves overall superior functional and aesthetic results.
- Bicoronal approach can be used for gaining access to severe craniofacial disjunction injuries including multiple or comminuted zygomatic complex fractures, Lefort II and III, frontal sinus and nasoethmoidal fractures.
- With an adequate knowledge of surgical anatomy and some modifications with the incision, facilitates the procedure with minimal or no significant complication.

REFERENCES:

1. Santhosh kumar shetty, Saikrishnan D, Santhosh kumaran: A Study on coronal incision for treating zygomatic complex fractures. Journal of oral and maxillofacial surgery 8(2):160-163, June 2009.
2. Rod J. Rohrich, Kris B Shewmake Evolving concepts of craniomaxillofacial fracture management Clinics in plastic surgery 19(1):1-10 Jan 1992.
3. A. Omar Abubaker, George Sotereanos: Use of coronal surgical incision for reconstruction of severe craniomaxilllofacial injuries. Journal of oral and maxillofacial surgery 48;579-586 ,1990.
4. Ashok kr. Grover, Shaloo Bageja: Techniques in the management of traumatic telecanthus. Journal of plastic and reconstructive surgery 68;395-396,2008.
5. Cheung LK, Samura N: A modified approach to lefort II osteotomy. Annals australas coll dental journal 14:107-113 Oct 1998.
6. Jin Sik Burm, Suk Joon Oh: Prevention and treatment of wide scar and alopecia in the scalp: wedge excision and double relaxation suture. Journal of plastic reconstructive surgery 103(4):1143-9, april 1999.
7. Munro Ian R, Chir B: The coronal incision revisited. Journal of plastic and reconstructive surgery 93(1):185-7, Jan 1994.
8. Qing Bing Zhang, Yao-Jun DONG: Coronal incision for treating zygomatic complex fractures Journal of craniomaxillofacial surgery 34: 182-185, 2006
9. Shepherd D.E, Ward Booth R.P: The morbidity of bicoronal flap in maxillofacial surgery British journal of oral and maxillofacial surgery 2(1): 5-8, Feb 1985
10. Srinivasan D, White N: Dual plane approach for calvarial exposure Journal of Craniofacial Surgery 21(2):506-507, March 2010.
11. John L Frodel, Lawrence J. Marennette: The coronal approach: anatomic and technical considerations and morbidity. Archives of Otolaryngology Head and Neck Surgery 119:201-207,1993.
12. Papay FA, Stein J, Luciano M: The microdissection cautery needle versus the cold scalpel in the bicoronal incisions. Journal of

craniofacial surgery 9(4): 344-7, 1998.

FIGURES:

Figure 1. Marking the incision line

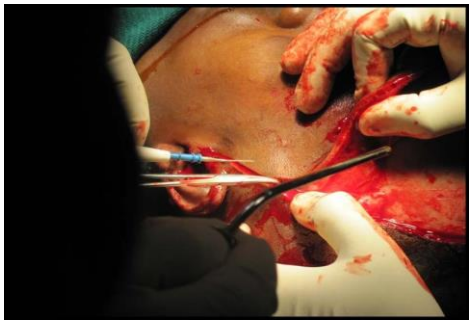

Figure 2. Subgalea dissection and extension over the preauricular region

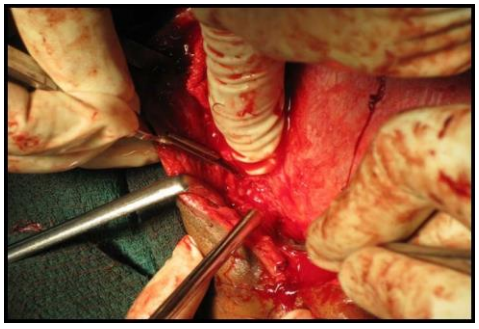

Figure 3. Incising the temporalis fascia at 45 degrees

Figure 4. Fixation of fracture fragments with miniplates