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FUNCTIONAL AND AESTHETIC OUTCOMES OF ORBITAL FLOOR RECONSTRUCTION IN ZYGOMATIC-ORBITAL COMPLEX TRAUMA

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ABSTRACT

Background:

Orbital floor fractures associated with zygomatic-orbital complex trauma represent a significant challenge in craniofacial surgery due to the risk of functional and aesthetic complications, including diplopia, enophthalmos, orbital asymmetry, and impaired ocular motility. Modern reconstructive approaches emphasize restoration of orbital anatomy and facial symmetry through individualized surgical planning and stable fixation techniques.

Objective:

To evaluate the functional and aesthetic outcomes of orbital floor reconstruction in patients with zygomatic-orbital complex trauma using clinical, radiological, and anthropometric assessment methods.

Materials and Methods

A retrospective clinical study included patients with zygomatic-orbital complex fractures involving the orbital floor. Preoperative and postoperative evaluation included computed tomography (CT), ophthalmologic examination, anthropometric facial analysis, and assessment of ocular motility. Surgical treatment consisted of open reduction and internal fixation combined with orbital floor reconstruction using titanium mesh and individualized reconstructive techniques.

Results:

Postoperative evaluation demonstrated restoration of orbital anatomy and significant improvement in facial symmetry. Reduction of enophthalmos, normalization of orbital volume, improvement of ocular motility, and resolution of diplopia were achieved in the majority of patients. Anthropometric analysis demonstrated restoration of midfacial projection and orbital symmetry. Stable functional and aesthetic outcomes were observed without severe postoperative complications.

Conclusion:

Comprehensive reconstruction of orbital floor defects in zygomatic-orbital complex trauma allows reliable restoration of orbital anatomy, ocular function, and facial aesthetics. Individualized surgical planning combined with objective anthropometric and radiological assessment improves postoperative outcomes and patient rehabilitation.

INTRODUCTION.

Fractures of the zygomatic-orbital complex are among the most common injuries of the midfacial skeleton and are frequently associated with orbital floor defects and displacement of orbital contents. Due to the complex anatomical structure of the orbit and its functional importance, inadequate treatment may result in persistent diplopia, enophthalmos, ocular motility disorders, and facial asymmetry [1,2].

Orbital floor reconstruction remains one of the most technically demanding procedures in maxillofacial and craniofacial surgery. The primary goals of surgical treatment include restoration of orbital volume, repositioning of herniated orbital tissues, reconstruction of orbital support structures, and re-establishment of facial symmetry [3].

Modern surgical management of orbital trauma has evolved toward individualized reconstruction using titanium mesh implants, patient-specific implants, and computer-assisted planning. These techniques allow accurate restoration of orbital anatomy and improve both functional and aesthetic outcomes [4,5].

Anthropometric analysis and radiological evaluation have become increasingly important in postoperative assessment of orbital reconstruction. Objective evaluation of orbital symmetry, globe position, and facial projection allows quantitative assessment of surgical outcomes and contributes to optimization of treatment strategies [6].

Despite significant advances in reconstructive techniques, postoperative complications such as residual enophthalmos, persistent diplopia, infraorbital nerve dysfunction, and facial asymmetry remain clinically relevant. Therefore, comprehensive evaluation of treatment outcomes is essential for improving long-term rehabilitation of patients with zygomatic-orbital trauma.

The purpose of this study was to evaluate functional and aesthetic outcomes following orbital floor reconstruction in patients with zygomatic-orbital complex fractures using clinical, anthropometric, and radiological assessment methods.

MATERIALS AND METHODS.

A retrospective clinical study was performed on patients diagnosed with zygomatic-orbital complex fractures involving the orbital floor who underwent surgical treatment at the Department of Maxillofacial Surgery of Tashkent State Medical University.

Inclusion criteria:

unilateral zygomatic-orbital complex fractures,
orbital floor involvement confirmed by CT,
presence of functional or aesthetic impairment,
surgical treatment performed within the acute or subacute period after trauma.

Exclusion criteria:

isolated nasal fractures,
severe ocular globe injury,
previous orbital surgery,
congenital craniofacial deformities.

Preoperative evaluation included:

clinical examination,
ophthalmologic assessment,
computed tomography,
anthropometric facial analysis,
evaluation of diplopia and ocular motility.

The following parameters were assessed:

enophthalmos,
orbital asymmetry,
infraorbital projection,
ocular motility restriction,
diplopia,
orbital volume restoration.

Anthropometric analysis was performed using standardized frontal and oblique photographic projections.

Statistical analysis was conducted using standard biomedical statistical methods. Differences were considered statistically significant at $p < 0.05$.

SURGICAL TECHNIQUE

Surgical treatment was performed under general anesthesia.

Open reduction of zygomatic-orbital fractures was achieved through combined transconjunctival and lateral eyebrow approaches. Fractured zygomatic fragments were mobilized and repositioned anatomically.

Orbital floor reconstruction was performed after careful release of incarcerated orbital soft tissues. Titanium mesh implants were individually adapted according to the defect configuration and fixed to stable bony margins.

Particular attention was paid to:
restoration of orbital volume,
support of the globe,
correction of infraorbital rim projection,
prevention of postoperative enophthalmos.

Rigid fixation of zygomatic buttresses was performed using titanium mini-plates and screws according to AO CMF principles.

Hemostasis was achieved, and wounds were closed in layers.

Table 1.

Comparative anthropometric assessment before and after surgery

Parameter	Preoperative	Postoperative	Assessment
MRD-1	~1–1.5 mm	~3–4 mm	Normalized
Palpebral fissure height	Reduced (5–7 mm)	Increased (10 mm)	Improved
Upper eyelid symmetry	Mild asymmetry	Symmetric	Restored
Eyelid contour	Flattened, ptotic	Smooth and elevated	Corrected
Brow position	Compensatory elevation	Relaxed physiological position	Improved
Dermatochalasis	Pronounced	Reduced	Improved
Superior visual field	Partially obstructed	Restored	Improved
Facial appearance	Tired, aged appearance	Rejuvenated and balanced	Improved
MRD-1	~1–1.5 mm	~3–4 mm	Normalized
Palpebral fissure height	Reduced (5–7 mm)	Increased (10 mm)	Improved

DISCUSSION

Restoration of orbital anatomy following zygomatic-orbital trauma remains a complex reconstructive challenge. The orbit represents a delicate anatomical structure where even minimal residual deformities may lead to functional impairment and aesthetic dissatisfaction [2,3].

In the present study, orbital floor reconstruction using titanium mesh implants provided stable restoration of orbital support structures and satisfactory globe positioning. Restoration of orbital volume played a critical role in prevention of postoperative enophthalmos and improvement of facial symmetry.

Modern literature emphasizes the importance of accurate orbital reconstruction and individualized implant adaptation. Titanium mesh remains one of the most reliable materials due to its biocompatibility, structural stability, and ability to reproduce complex orbital contours [4,5].

Anthropometric assessment allowed objective evaluation of postoperative outcomes. Restoration of infraorbital projection and orbital symmetry contributed significantly to overall facial rehabilitation and patient satisfaction.

Functional recovery was characterized by improvement of ocular motility and reduction of diplopia. These findings correspond with previously reported studies demonstrating the effectiveness of early anatomical reconstruction in orbital trauma [6,7].

The limitations of the present study include retrospective design and limited sample size. Further prospective studies with long-term follow-up are necessary to evaluate stability of reconstructive outcomes.

CONCLUSION

Comprehensive surgical reconstruction of orbital floor defects in zygomatic-orbital complex trauma provides reliable restoration of orbital anatomy, ocular function, and facial symmetry.

The use of individualized reconstructive techniques combined with objective anthropometric and radiological assessment allows significant improvement of functional and aesthetic outcomes.

Modern orbital reconstruction techniques contribute to effective rehabilitation and improved quality of life in patients with midfacial trauma.

REFERENCES.

1. Ellis E, Perez D. An algorithm for the treatment of isolated zygomatico-orbital fractures. J Oral Maxillofac Surg. 2014;72(10):1975–1983.
2. Hammer B. Orbital Fractures: Diagnosis, Operative Treatment, Secondary Corrections. Seattle: Hogrefe & Huber; 1995.
3. AO Foundation CMF Principles in Orbital Reconstruction. AO CMF Trauma Guidelines.
4. Dubois L, Steenen SA, Gooris PJ, Mourits MP, Becking AG. Controversies in orbital reconstruction—II. Timing of post-traumatic orbital reconstruction. Int J Oral Maxillofac Surg. 2015;44(4):433–440.
5. Kontio R. Treatment of orbital fractures: the case for reconstruction with bioresorbable materials. J Oral Maxillofac Surg. 2004;62(7):863–868.
6. Farkas LG. Anthropometry of the Head and Face. 2nd ed. Raven Press; 1994.
7. Boyette JR, Pemberton JD, Bonilla-Velez J. Management of orbital fractures: challenges and solutions. Clin Ophthalmol. 2015;9:2127–2137.