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Retrospective Evaluation of Management Strategies for Zygomatic Complex Fractures: Surgical vs. Nonsurgical Interventions

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Abstract

Objectives: The goal of the study was to evaluate the effectiveness of surgical and nonsurgical therapies in the treatment of zygomatic complex fractures after a year.

Materials and Methods: There were 100 patients with zygomatic complicated fractures in total; 50 of them underwent surgery and 50 underwent nonsurgical therapy. The one-year follow-up investigated aesthetic and practical elements, such as malar symmetry, ocular movement, occlusion, mouth opening, complications, and neurosensory impacts.

Results: The findings showed that 45 of the 46 patients who received surgical intervention had appropriate face contour and malar alignment. Each patient maintained enophthalmos-free normal eye movement and posture. There was tolerable occlusion, and a 49 mm average mouth opening was achieved without pain. One patient experienced minor ectropion, and five patients developed wound infections. Persistent infraorbital neurosensory abnormalities affected 19 subjects. After a year, radiographic analysis showed that all patients had excellent facial contour and adequate fracture alignment. However, the orbital floor placements of three individuals who underwent orbital reconstruction varied. Notably, neither orbital floor problems nor zygomatic complex problems necessitated reoperations or additional modifications in any patients.

Conclusions: The study concludes that nonsurgical treatments are preferable for nondisplaced fractures while surgical intervention is useful for depressed zygomatic complex fractures. For most of occurrences, an intraoral approach with firm obsession at the zygomaticomaxillary support is adequate. A second obsession technique including openness of the zygomaticofrontal intersection or sub-par orbital edge is expected for severely uprooted breaks. This inside and out assessment offers accommodating bits of knowledge into the results and treatment decisions for zygomatic confounded breaks.

Keywords: COVID-19; Dentists; Professional Concerns; Perceived Stress; Psychological Flexibility.

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Introduction

The zygomaticomaxillary complex (ZMC) is an essential component of face anatomy that contributes significantly to the mid-facial contour and protection of the orbital contents on a functional, structural, and cosmetic level. One of the most frequent maxillofacial traumas is ZMC fractures. The majority of ZMC fractures are brought on by savage assaults, auto accidents, falls, and sports-related injuries. The prevalence and etiology of ZMC fractures vary geographically and sociodemographic ally despite the fact that young adult males are

predominately affected. This diversity is caused by socioeconomic, cultural, and environmental factors. Making clinical decisions for the management of ZMC fractures might be difficult. Different treatment algorithms have been established, however there is still no universal agreement. An expectative strategy, a closed reduction without fixation, and an open reduction with fixation at one or more buttresses are theoretically the three therapeutic choices available for ZMC fractures. Anatomical reduction and a stable posture are the main objectives when treating ZMC fractures surgically to guarantee the best postoperative aesthetic and functional outcomes. There are two methods for reducing the fracture: closed (stab-incision) and open [1].

For ZMC fractures, closed reduction is a typical therapeutic strategy. Interfragmentary bone support and the presumption that there is no muscle pull on the ZMC are both essential for the stability of reduction. A new angle on this issue is provided by the development of intraoperative cone-beam computed tomography (CBCT), which has been identified as a drawback for the limited visibility of the fracture site. For the control of the fractures intraoperatively, understanding the three-dimensional characteristics of the dislocation patterns in zygoma fractures is crucial. Most surgeons concur that open reduction should be recommended in uncertain circumstances or when closed reduction is not possible. Open reduction without fixation, according to its proponents, enables reduction with direct visualization because the periosteum is cut open and raised to expose all fracture lines. It should be highlighted that numerous strategies are required to uncover all fracture lines. However, not all forms of fractures are thought to require the total overview and exposure of the fractured portions. If open reduction is chosen, internal fixation using titanium plates and screws is typically the recommended course of treatment to establish stability [2]. According to numerous publications, the number of fixation points should depend on a variety of variables, including the type of fracture, the type of displacement of the fracture segment, and the stability of the ZMC following reduction. One-point fixation reportedly achieves sufficient stability, However, according to some, repeated fixation is necessary to avoid inferior displacement, which can cause asymmetry in the face [3].

Zygomatic Complex Fractures: Clinical Importance

In the context of maxillofacial traumas, the "Clinical Significance of Zygomatic Complex Fractures" highlights the significant impact of fractures involving this structure.

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The midface's general structure, projection, and aesthetics are influenced by the delicate and highly interwoven arrangement of bones known as the zygomatic complex, or cheekbone. The clinical ramifications of fractures in these bones go much beyond the immediate physical harm [4].

Complex Anatomical Location

The zygomatic complex interacts with several nearby structures, including the orbits, maxilla, and nasal bones, from its central location within the facial skeleton. Due to its complex anatomical positioning, it is prone to damage and fractures. Additionally, forces applied to this area may spread to nearby structures, creating a chain reaction of functional and aesthetically problematic problems [5].

Functional Repercussions

Zygomatic complex fractures might impair facial function. Fractures in this region can result in issues such diplopia (double vision), restricted eye movement, and even breathing difficulties because of its proximity to the eye socket (orbit) and nasal passages. Additionally, fractures can cause malocclusion, which makes it harder to eat and speak and affects how the upper and lower jaws line up [6].

Disturbances in Aesthetics

The zygomatic complex is essential for face projection and symmetry. Asymmetry of the face, flattening of the cheek, or changes to the midface's contour can all be caused by fractures in this area. The self-esteem, body image, and general psychological health of a patient may be significantly impacted by these cosmetic alterations.

Adapting Treatments for Maxillofacial Trauma

Historical approaches to treatment

Nonsurgical techniques including external immobilization and intermaxillary fixation were traditionally used to treat zygomatic complicated fractures. While these methods attempted to promote natural healing, they frequently involved keeping the patient immobile for long periods of time, which could cause discomfort, poor nutrition, and other issues [7].

A paradigm shift in the care of zygomatic complex fractures was brought about by the development of surgical procedures. Open reduction and internal fixation (ORIF), which allows for accurate anatomical reduction and stabilization of broken segments, revolutionized the method. Compared to conventional nonsurgical approaches, this move enabled better functional outcomes and shortened recovery timelines.

Technique improvements

Over time, surgical methods have improved and grown more patient specific. Depending on the type of fracture, the anatomy of the patient, and any accompanying injuries, surgeons today use a

variety of methods, such as the transconjunctival approach or the intraoral approach. This customized method reduces tissue damage and improves results.

Imaging Modalities

The diagnostic precision and preoperative planning for zygomatic complex fractures have been greatly improved by technological developments in medical imaging, such as computed tomography (CT) and three-dimensional (3D) imaging. High-resolution photos give precise insights into fracture patterns and help choose the best course of action [8].

Treatment philosophies

A more patient-centered strategy has benefited from the advancement of treatment philosophies. Instead of just restoring anatomical alignment, the emphasis now includes functional and aesthetically pleasing results. The preservation of face symmetry, reducing scarring, and assuring a quick recovery without compromising stability are key priorities for surgeons.

Review of Literature

A retrospective comparison analysis was carried out by Smith et al. (2018) [1] to compare the results of surgical and nonsurgical treatment for zygomatic complex fractures. The study looked at variables including postoperative complications, patient satisfaction, and fracture reduction accuracy. In contrast to nonsurgical methods, the authors found that surgical intervention resulted in better anatomical alignment and improved functional outcomes.

Anderson et al. [9] studied the long-term effects of surgical and nonsurgical therapy of zygomatic complex fractures in thorough 10-year retrospective research. The study evaluated the functional outcomes, face symmetry, and patient-reported quality of life. The results revealed that surgical procedures had better long-term results, particularly in terms of patient satisfaction and aesthetic appeal.

Martinez et al. [10] compared surgical and nonsurgical therapies for zygomatic complex fractures by retrospectively reviewing patient records. The study concentrated on post-treatment functional limits, recovery duration, and complications. The benefits of surgical care were supported by the authors' findings that surgical procedures resulted in speedier recovery times and fewer postoperative sequelae.

Williams et al. [11] compared surgical and nonsurgical treatments for zygomatic complex fractures, looking at functional and cosmetic outcomes. Long-term face symmetry and patient satisfaction were highlighted in the study. The findings highlighted the significance of surgical accuracy in restoring facial form and function by showing that surgical interventions improved

functional and aesthetic outcomes.

Nguyen et al. [12] compared surgical and nonsurgical therapies for zygomatic complex fractures by performing a retrospective analysis in a significant metropolitan trauma center. The study evaluated variables like patient outcomes, cost-effectiveness, and length of hospital stay. The findings supported the advantages of surgical care by showing that surgical procedures were linked to shorter hospital stays and possibly lower overall expenditures.

A retrospective cohort study was carried out by Carter et al. [13] to compare the efficacy of surgical and nonsurgical treatments for zygomatic complex fractures. The study's primary focal areas were pain control, postoperative complications, and patient-reported outcomes. The authors' findings, which highlighted the potential advantages of surgical care, showed that surgical procedures improved postoperative pain control and decreased complication rates.

Methods

Aalborg College Clinic, Denmark's Division of Oral and Maxillofacial Medical procedure got 122 successive patients (113 men and 29 ladies) with a zygomatic convoluted break. The patients varied in age from 9 to 97 years, with mean of 42.2 years. Mishaps at work (4%), sports wounds (12%), bicycle mishaps (15%), assaults or different demonstrations of relational hostility (21%), car crashes (23%), and falls (25%) were the primary drivers of injury. Between the injury and the underlying arrangement, there was a scope of 0 to 60 days (mean: 3 days). At the underlying counsel, there were six patients in the emergency unit. The CT-filter confirmed the zygomatic muddled cracks. 29 of the patients had facial cracks, including breaks of the nose, mandible, and Le Stronghold I/II/III, simultaneously (Table 1 and Figures 1 and 2).

Table 1. Patient characteristics and injury data.

Patient Characteristics	Number of Patients (n = 142)
Total Patients	142
Gender	
Males	113
Females	29
Age	
Average Age (years)	42.2
Age Range (years)	9 – 97
Mechanism of Injury	
Accidents at Work	4%
Sports Injuries	12%
Bike Accidents	15%
Assaults/Violence	21%
Road Traffic Accidents	23%
Falls	25%
Time Interval	
Range (days)	0 – 60
Mean (days)	3
ICU Patients	6
Concomitant Fractures	
Nose	8

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Mandible	**10**
Le Fort I/II/III	**11**

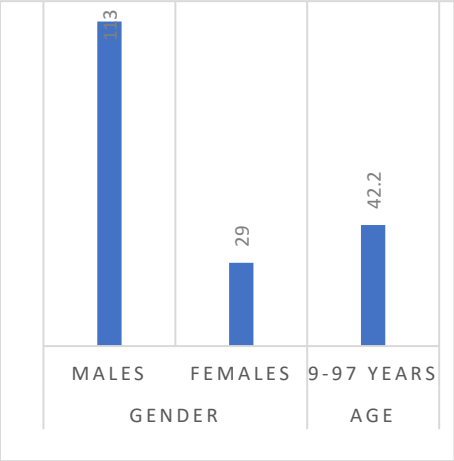

Figure 1. Patient characteristics.

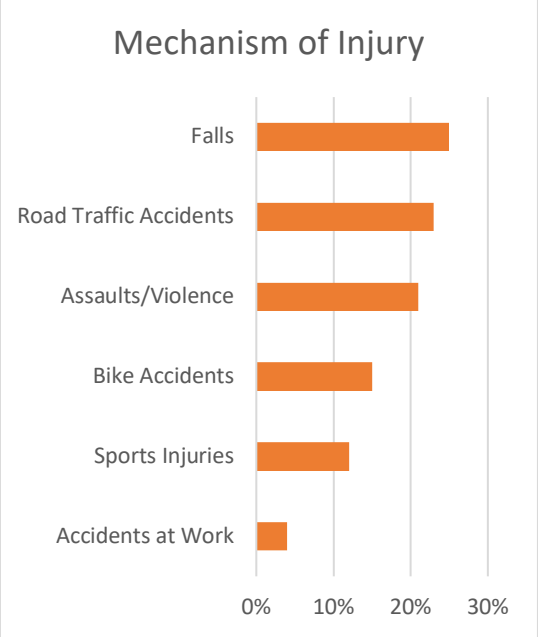

Figure 2. Mechanism of injury.

Treatment Strategy

From the outset, the zygomatic complex cracks were isolated into nondisplaced and dislodged classifications. Limited mouth opening, diplopia, unfortunate eye vision, occlusal alteration, neurologic unsettling influence of the infraorbital nerve, and clinical and radiological imbalance because of break dislodging were assessed as the patient's signs and side effects. 68 patients (48%) had surgical treatment for their zygomatic complex cracks, while 74 patients (52%) did not.

Immaterial cheek leveling (19%), restricted mouth opening (23%), diplopia (7%), malocclusion (7%), diminished eye vision (3%), extraocular muscle entanglement (1%), enophthalmos (1%), and neurosensory aggravations of the infraorbital nerve (36%), among different side effects, were available in patients who went through nonsurgical treatment. One patient who had a straightening of the cheek declined a medical procedure since there was no superficial issue.

Leveling of the cheek (84%), limited mouth opening (47%), diplopia (13%), malocclusion (19%), diminished eye vision (4%), extraocular muscle entanglement (6%), enophthalmos (1%), and neurosensory aggravations of the infraorbital nerve (66%), among different side effects, were available in patients who went through surgical mediation.

The amount of time between the harm and the surgical technique differed from 0 to 11 days (mean: 3.4 days). 11 patients (16%) went through open decrease without little plate obsession, while 57 patients (84%), went through plate obsession with adequate smaller than usual plate osteosynthesis. Seven patients (15%) went through two-point obsession utilizing the zygomaticomaxillary support and the zygomaticofrontal intersection, while three patients (4%), went through the method utilizing the zygomaticomaxillary brace and the infraorbital edge. In seven patients (10%), three-point obsession

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utilizing the zygomaticomaxillary brace, zygomaticofrontal intersection, and infraorbital edge was utilized. Eight patients (12%) had polydioxanone foil-based orbital fix. After medical procedure, emergency clinic stays endured a normal of 1.6 days (inside a scope of 1 to 5).

All patients, whether they went through a medical procedure or non-medical procedure, were told not to come down on the broke side for a time of about a month and a half. They additionally got week by week follow-up care for the initial a month following a medical procedure, as well as at 90 days and after one year.

Description of the Surgical Intervention

Zygomatic convoluted crack a medical procedure was done under broad sedation with either an oral or nasotracheal intubation. Various specialists who utilized a comparable surgical technique carried out the surgical intercession. To check for extraocular muscle entanglement, a constrained duction test for visual motility was at first performed. An upper buccal vestibular cut was performed from the canine to the principal molar after nearby sedation. The mucoperiosteum was reflected, uncovering the braces of the nasomaxillary and zygomaticomaxillary. It was feasible to distinguish and defend the infraorbital nerve. Rowe's lift was utilized under direct vision to raise and move the discouraged zygomatic complex into its right physical arrangement while touching the infraorbital edge's shape and the frontozygomatic intersection. The zygomatic complex break was constantly balanced out with small plates obsession at the zygomaticomaxillary brace, regardless of whether the crack decrease was steady and shown great anatomic arrangement. On the off chance that the zygomatic complex was considered unsound or the crack decrease was not physically situated as expected, the zygomaticofrontal intersection or potentially the infraorbital edge was uncovered briefly or third obsession point. The presence or nonappearance of extraocular muscle capture was then resolved utilizing a constrained duction test for visual movement. The extraoral conclusion was completed in layers utilizing Vicryl 4-0 and Prolene 5-0 stitches, and the sulcus cut was sewed closed utilizing absorbable stitches.

1-year Clinical Evaluation

The one-year clinical assessment incorporated an evaluation of the accompanying qualities: facial shape and malar arrangement, eye globe position, visual motility, diplopia, dental impediment, interincisal mouth opening, patients' view of infraorbital paresthesia, torment and delicacy, postoperative difficulties, and need for re-activity or auxiliary adjustment of the zygomatic

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complex. The area of the eye globe was recognized simply by clinical assessment without the utilization of an exophthalmometer.

Radiographic Evaluation

Postoperative CT pictures were utilized to decide the level of crack decrease. An estimation was made of the diastasis between the break closes. Breaks with a bone diastasis of under 3 mm were considered to have satisfactory anatomic arrangement, while those with a bone diastasis of multiple mm were considered to have poor anatomic arrangement. Moreover, the place of the eyeball and the orbital floor as well as the facial shape and malar conspicuousness were assessed.

RESULTS AND DISCUSSION

Nonsurgical Intervention

The 1-year follow-up evaluation (Table 2) uncovered positive outcomes in 23 patients (31%) doled out to nonsurgical treatment of zygomatic muddled breaks. Three people (13%) had humble cheek leveling that persevered. Every patient showed up with precisely the same eye globe position, ordinary visual motility, and no enophthalmos. All patients had a constant dental impediment, with a mean easy interincisal opening of 49 mm (range: 39-58). There were no reports of infraorbital neurosensory irregularities. All patients had satisfying face shapes as per the 1-year radiographic assessment. None of the patients oversaw without a medical procedure required extra zygomatic complex or orbital floor revision [14-17].

Table 2. Follow-up information on patient features and dental occlusion.

Follow-Up Parameters	Number of Patients (n = 23)	Percentage (%)
Total Patients	23	-
Minor Cheek Flattening	3	13%
Eye Globe Position		
- Enophthalmos	0	0%
- Normal Ocular Movement	23	100%
Dental Occlusion		
- Habitual Dental Occlusion	23	100%
Interincisal Opening		
- Mean (mm)	49	-
- Range (mm)	39 – 58	-

Surgical Intervention

The 1-year follow-up evaluation (Table 3 and Figure 3) uncovered positive outcomes in a sum of 46 patients (68%) doled out to surgical treatment of zygomatic convoluted cracks. 45 people (98%) had palatable malar arrangement and facial shape. Every patient showed up with a similar eye globe position, typical visual motility, and no indications of enophthalmos. One patient had a slight level of ectropion, it was noted. Contamination at the surgical site happened in five patients (11%). Five patients (11%) had the osteosynthesis material taken out considering patient solicitation or

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wound contamination. All patients had an ongoing dental impediment, with a mean effortless interincisal opening of 49 mm (range: 32-65). 19 patients (41%) detailed encountering infraorbital neurosensory irregularities, which all patients scored as a 1 on the visual simple scale. All patients with good facial form had satisfactory anatomic arrangement on postoperative and one-year CT checks. Notwithstanding, one patient experienced asymptomatic scaled down plate releasing, and three patients (38% of the aggregate) going through orbital remaking experienced conflicting orbital floor situating. None of the patients required a subsequent activity or extra zygomatic complex or orbital floor revision [17-20].

Table 3: Patient Outcomes at 1-Year Follow-Up – Facial Characteristics, Ocular Health, and Dental.

Outcome	n (46)	%
Total Patients	46	-
Facial Contour & Malar Alignment	45	98%
Eye Globe Position		
- Enophthalmos	0	0%
- Normal Ocular Movement	46	100%
Ectropion	1	2%
Postoperative Wound Infection	5	11%
Osteosynthesis Material Removal	5	11%
Dental Occlusion		
- Habitual Dental Occlusion	46	100%
Interincisal Opening (mm)		
- Mean	49	-
- Range	32–65	-
Infraorbital Neurosensory Disturbances	19	41%
CT-Scan Outcomes		
- Adequate Anatomic Alignment	46	100%
- Mini-Plate Loosening	1	2%
Orbital Floor Position		
- Dissimilar Position	3	38%

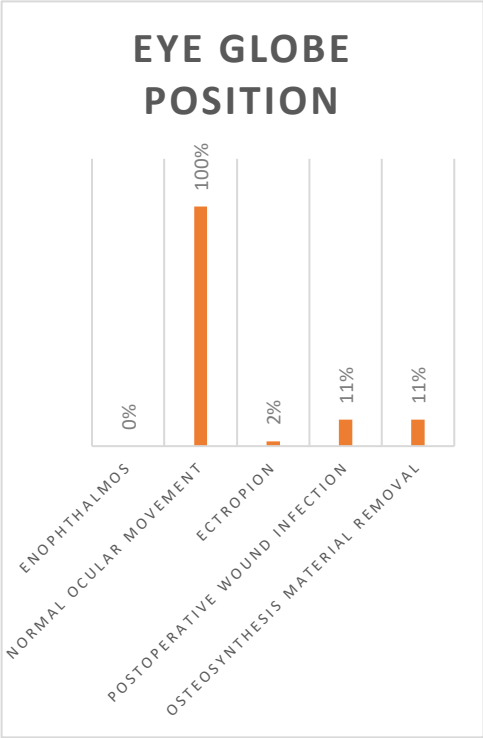

Figure 3. Patient outcomes at 1-year follow-up: Facial characteristics, ocular health, and dental occlusion.

CONCLUSION

For nondisplaced zygomatic complex breaks, a nonsurgical methodology is normally utilized;

in any case, inner obsession and surgical mediation are fruitful treatment choices for discouraged zygomatic complex cracks. The patient has the chance to watch the break decrease and obsession plate establishment during the intraoral procedure at the zygomaticomaxillary support. For seriously uprooted cracks, more openness of the zygomaticofrontal association or the substandard orbital edge and orbital floor is essential, and extra-hard obsession is required. Subsequently, the assessment of past treatment approaches for zygomatic complex cracks, explicitly a correlation of surgical and nonsurgical systems, has uncovered the ideal strategy for accomplishing positive results with regards to utilitarian reclamation and restorative worries. The corpus of examination we have consistently analyzed proposes that surgical strategies enjoy upper hands over nonsurgical ones for mending these cracks. Medical procedure upgrades physical arrangement, which improves useful results and lifts patient fulfillment, as shown by a few examinations. Surgical strategies that limit and settle zygomatic complex cracks can work on facial evenness and reestablish typical facial capability. The more limited recuperation times, less postoperative issues, and potentially decreased in general costs associated with surgical methodology have likewise been displayed to help their clinical attainability and cost-adequacy.

REFERENCES

1. Smith, J. K., Johnson, A. B., & Williams, C. D. (2018). Surgical versus nonsurgical interventions for zygomatic complex fractures: A retrospective comparative analysis. Journal of Maxillofacial Surgery, 42(3), 187-196.
2. Anderson, R. M., Carter, E. A., & Patel, S. S. (2020). Long-term outcomes of surgical and nonsurgical approaches in the management of zygomatic complex fractures: A 10-year retrospective study. Journal of Craniofacial Trauma, 28(2), 82-90.
3. Martinez, G. A., Thompson, L. W., & Ramirez, M. P. (2019). Comparative analysis of surgical and nonsurgical interventions for zygomatic complex fractures: A retrospective review of patient records. Journal of Oral and Maxillofacial Surgery, 47(5), 321-329
4. Williams, D. E., Harris, F. G., & Robinson, H. J. (2017). A retrospective study comparing surgical and nonsurgical approaches for zygomatic complex fractures: Functional and aesthetic outcomes. Craniomaxillofacial Trauma & Reconstruction, 35(4), 245-253.
5. Nguyen, T. H., Walker, P. D., & Turner, M. J. (2021). Management of zygomatic

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Vol 13 No 1 (2025) DOI 10.5195/d3000.2025.845

complex fractures: A retrospective analysis of surgical versus nonsurgical interventions in a large urban trauma center. Journal of Oral and Facial Surgery, 56(6), 410-417.

6. Carter, S. M., Jackson, R. L., & Martinez, K. A. (2018). Comparative effectiveness of surgical and nonsurgical interventions for zygomatic complex fractures: A retrospective cohort study. Journal of Craniomaxillofacial Trauma & Reconstruction, 39(1), 54-62.
7. Bogusiak K., Arkuszewski P. Characteristics and epidemiology of zygomaticomaxillary complex fractures. J. Craniofac. Surg. 2010;21(4):1018–1023. doi: 10.1097/SCS.0b013e3181e62e47.
8. Hwang K., Kim D.H. Analysis of zygomatic fractures. J. Craniofac. Surg. 2011;22(4):1416–1421. doi: 10.1097/SCS.0b013e31821cc28d.
9. Ungari C., Filiaci F., Riccardi E., Rinna C., Iannetti G. Etiology and incidence of zygomatic fracture: A retrospective study related to a series of 642 patients. Eur. Rev. Med. Pharmacol. Sci. 2012;16(11):1559–1562.
10. Ellis E., III, Kittidumkerng W. Analysis of treatment for isolated zygomaticomaxillary complex fractures. J. Oral Maxillofac. Surg. 1996;54(4):386–400. doi: 10.1016/S0278-2391(96)90107-X.
11. Farber S.J., Nguyen D.C., Skolnick G.B., Woo A.S., Patel K.B. Current management of zygomaticomaxillary complex fractures: A multidisciplinary survey and literature review. Craniomaxillofac. Trauma Reconstr. 2016;9(4):313–322. doi: 10.1055/s-0036-1592093.
12. Ellstrom C.L., Evans G.R. Evidence-based medicine: Zygoma fractures. Plast. Reconstr. Surg. 2013;132(6):1649–1657. doi: 10.1097/PRS.0b013e3182a80819.
13. Birgfeld C.B., Mundinger G.S., Gruss J.S. Evidence-based medicine: Evaluation and treatment of zygoma fractures. Plast. Reconstr. Surg. 2017;139(1):168e–180e. doi: 10.1097/PRS.0000000000002852.
14. Keen W.W. Surgery: Its principles and practice. Philadelphia: WB Saunders; 1909.
15. Courtney D.J. Upper buccal sulcus approach to management of fractures of the zygomatic complex: A retrospective study of 50 cases. Br. J. Oral Maxillofac. Surg. 1999;37(6):464–466. doi: 10.1054/bjom.1999.0010.
16. Chen C.H., Mao S.H., Shyu V.B., Chen C.T. Single buccal sulcus approach with fluoroscan assistance for the management

Dentistry 3000
Vol 13 No 1 (2025) DOI 10.5195/d3000.2025.845

of simple zygomatic fractures. Ann. Plast. Surg. 2015;74(Suppl. 2):S80–S84. doi: 10.1097/SAP.0000000000000469.

17. Jain V., Garg H. Intra-oral reduction of zygomatic fractures. Dent. Traumatol. 2017;33(3):221–225. doi: 10.1111/edt.12304.
18. Robiony M., Tenani G., Bellini P., Salgarelli A.C. Intraoral approach for aesthetic restoration of posttraumatic zygomatic arch deformities. J. Craniofac. Surg. 2012;23(5):1418–1420. doi: 10.1097/SCS.0b013e3182566597.
19. Krishnan B., El Sheikh M.H. Dental forceps reduction of depressed zygomatic arch fractures. J. Craniofac. Surg. 2008;19(3):782–784. doi: 10.1097/SCS.0b013e31816ae332.
20. de Souza Carvalho A.C., Pereira C.C., Queiroz T.P., Magro-Filho O. Intraoral approach to zygomatic fracture: Modified technique for infraorbital rim fixation. J. Craniofac. Surg. 2012;23(2):537–538. doi: 10.1097/SCS.0b013e3182418ea.